# CHDK

## Extra Features
## For Canon® Powershot® Cameras

## User Quick Start Guide



**Canon Hack Development Kit**

User Quick Start Guide

V.1.9.1 © December 2011

**For Canon Cameras with CHDK**

For installation instructions go to
**http://chdk.wikia.com/wiki/CHDK**

**CHDK**

**Canon Hack Development Kit**

User Quick Start Guide

V.1.9.1 © December 2011

Notes

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## Acknowledgements

CHDK has to be one of the most innovative improvements to any camera that has ever come along since the beginning of photography. Started out by some people who only wanted RAW out of their raw-crippled cameras, it has now grown into one of the most adaptable, flexible, and full-featured operating systems of any cameras ever made. We are all extremely grateful for the work that everyone has put into this arena of discovery, implementation, coding, sharing, camera testing, (especially with the unknown, and possibly high risk), and those that provide all the information on the Wiki pages (and elsewhere in the world). Those who have contributed to this great stride in the world of photography deserve a huge vote of thanks.

Many thanks go to the original developers *vitalyb,* and *GrAnd, ewavr, owenjm, Harvester, jeff666, [mr.anon], MX3, Fingalo, Allbest, CHDKLover, BarneyFife,* also to *Jucifer* and *PhyrePhoX,* and to *cosmograph* for the excellent CHDK logo, and to all the others mentioned or not, in History of CHDK, **See**: page 47

Other contributors include, *acseven* (the forum), *achurch, acid2000, ADamb, ArtDen, atalwar, Atnas, auj, awdark,, barberofcivil, Basq, Bg~, bondo, bperrybap, brabl2, brake, Brend R, bygbit, cail, chdkj, chr, cormac, cppasm, cyril42e, danielmewes, Darkness, DataGhost, DavidB, diablo, Divalent, ehmu, elecktro255, ERR99, fantomas4o, fboesch, fbonomi, fe50, fishpepper, f_m_b, fudgey, funnel, gajownik, Grin, Hacki, HarpoMa, hiker_jon, h-v-n, iax, ihar, Intrnst, image13, jstanley0, Keoeeit, KevB m2tk, ma_jk, MartinBudden, mattkime, Microfunguy, mipa87, mkmenuts, mproko, mrblack51, mrowl, MrSpoon, msl, mweerden, nandoide, neszt, nimrod, nirschi, Novex, oldgit, outslider, pedropaislopes, peregrine, pev69, philmoz, pixeldoc2000, PlasmaHH, quietschi, RaduP, revivery, reyalp, Rorschach, rudi, sharky, shenty, Smartkiller, snc, snowsnapshots, srsa_4c, stift, stevetm2, syahmixp, taliesin,Thorwak, tillo, toinech, tommi2water, TPC, tr1stan, tsvstar, ultimA, uvvv, Velo, viulian, vit40, waldo, waterwingz, whim, whoever, wontolla, xiaofeng, Yarvieh, Yossar, zeno, zfeet,* and for a significant discovery which has been named 'Canon Basic' - *Oren Isacson* and *Alfredo Ortega*

and more to come……. Many thanks.

And to the firmware dumpers and language translators - Many thanks.

Thanks to *Graystar* for the Allbest 50 manual, and to the writers of the online Morebest manual *, and everyone else who has contributed however small or large to CHDK and the Wiki pages.
*(these pages are based upon those and updated to reflect the latest changes to what has become the combined collaborative CHDK)

Please report errors &/or omissions to the CHDK forum: –
http://chdk.setepontos.com/index.php/topic,1167.0.htmlß

Front cover photo – Canon Powershot SX230HS [1]



### ✎Notes

2011 camera releases, including the SX40HS, can work with SD cards formatted up to 32GB - it is no longer required to partition the card to have CHDK autoboot.

The following steps should work on any card up to 32GB
- format the card in the camera
- copy the full CHDK download (unzipped) to the SD card (DISKBOOT.BIN, and PS.FI2 plus the CHDK directory)
- lock the card and start the camera with the rear playback button
- press the Menu button and select 'Firm Update...' from the bottom of the first menu
- when CHDK reboots enter <ALT> mode
- select 'Make Card Bootable' from the 'Miscellaneous Stuff' CHDK menu
- restart the camera and CHDK should now autoboot

Thanks to philmoz.

## Introduction

### Welcome to CHDK, for users of Canon® Powershot® Cameras

**Q. What is the CHDK program?**

**A.** CHDK enhances the capabilities of your camera in a non-destructive, non-permanent way.

After loading of CHDK program your camera will have the following extra functionality:

- Shutter-priority (Tv) exposure - via shutter value override feature
- Aperture-priority (Av) exposure - via aperture value override feature
- Shooting in RAW, with RAW Average, RAW Sum, and RAW Develop features, save as .DNG (Digital Negative for wider compatibility)
- Live histogram (RGB, blended, luminance and for each RGB channel)
- Zebra mode (a live view of over and under-exposed areas of your picture)
- Depth-of-field (DOF)-calculator, Hyperfocal-calculator with instant Hyperfocal and Infinity focus-set, and more
- Battery indicator
- RAW and Video space-remaining gauges with custom low-limit alerts
- USB cable and wireless remote shutter release
- Motion-detection trigger - automatically fires camera on motion detection. (Able to capture lightning strikes.)
- Customizable high-speed continuous (burst) Shutter-based (Tv), aperture-based (Av) and ISO-based exposure bracketing (unlimited shots)
- Focus bracketing (unlimited shots)
- Adjustable Video quality and size (compression) adjustable while recording
- Elimination of 1 GB video-size limit (for many DigicII cameras)
- Zoom during video function (for cameras without this feature)
- Shutter, Aperture, and ISO Overrides
- Ultra-long shutter speeds - up to 64 seconds (much longer for supported cameras)
- Ultra-fast shutter speeds - up to 1/10,000" and higher
- High-speed Flash Sync at all speeds up to 1/64,000 of a second
- Custom user-editable visible Grids for framing, cropping, and alignment
- File browser
- Text reader
- Calendar
- Games
- Fully customizable CHDK display, info placement, user-colors, fonts in menus, etc.
- Custom CHDK User Menu (for instant recall of up to 10 favorite functions)
- Scripts execution - including exposure bracketing, focus bracketing, intervalometer, etc
- And other features too numerous to mention here.

The new features are accessed through CHDK-specific menus, rather than the default camera menus. As CHDK is continually evolving, new features are added as they are developed. Updating occasionally will ensure you have all the latest features for your camera.

Check out the Camera Features and Downloads pages for information on finding the right build for your needs.

**Go to:-** http://chdk.wikia.com/wiki/Downloads

# Using CHDK

## To Start – Auto load method

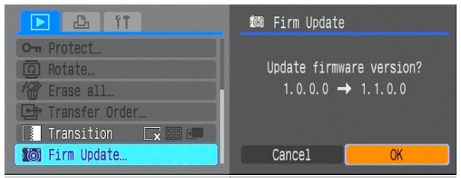
Cameras that have an SD card that has been prepared as bootable and is locked (write protected, with the slide tab on the side of the card), will load CHDK automatically when turned on. This is usually called the "Autoload" or "Autoboot" method, using a camera version specific file "DISKBOOT.BIN"

The card lock is bypassed by CHDK and photos and video are able to be saved as normal.

## – Manual load method

When the SD card has a camera specific file, which for some versions is "PS.FIR", and others "PS.FI2", the card is left unlocked and then:

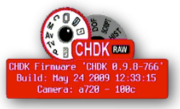
1. Switch the camera on in **Play mode**, not Record mode,
2. Press the MENU button, then press UP once (or scroll down the menu list)
3. An option to update the firmware appears, Select that option (press FUNC.SET)
4. Confirm the update, (OK-press FUNC.SET)




**See**:- http://chdk.wikia.com/wiki/Bootable_SD_card
for instructions to make memory card bootable, and information on the loading process.

The CHDK splash screen will appear for about 2 seconds, while the Print button blue led flashes, confirming that CHDK has now loaded into the camera's memory. (The splash screen can be disabled in Main Menu > Miscellaneous stuff).

Splash screen logo




CHDK will now be running in the background. Some features are enabled by default, for example, battery and file space indicators. However, most features are disabled by default.

- *To make changes to how CHDK operates, **you start by entering <ALT> mode**.*

## Index

## Legal notes





## <ALT> Mode

When <ALT> mode is enabled the function of certain buttons on the camera will change, allowing you to start accessing CHDK features. For example, pressing the FUNC.SET button will display the CHDK Script menu, rather than the usual function associated with FUNC.SET.

- *There are different ways to enter <ALT> mode, depending on the style of camera.*

**A Series** – Press the Direct Print button (*A momentary short press*)
**G Series** – Press the Shortcut / Print button *
**S Series** – Press the Shortcut / Print button *
**SD / IXUS Series** – Press the Direct Print button
**SX 200** – Press the Direct Print button
**SX10, 20, 30** – Press the Shortcut / Print button *

**Note:** Check the Wiki for your camera's CHDK Specialties, for instance the MODE button for <ALT> on certain models e.g. A480

* See note on page 6 about Shortcut button.

Also, while in <ALT> mode the following buttons are reassigned:

**A Series** – Exposure/Erase - Toggles RAW capture mode
**G Series** – AF Frame Selector / Erase – Toggles RAW capture mode
**S Series** – FUNC.SET – Toggles RAW capture mode
**SD / IXUS Series** – DISP. – Toggles RAW capture mode
**SX 200** – " " " " "
**SX10, 20, 30** – AF Frame Selector / Erase – Toggles RAW capture mode

- See notes on page 43 about <ALT> button.

### Common to most cameras

- MENU – Displays the main CHDK menu
- FUNC.SET – Display the Script menu
- DISP. Button -- Return to previous menu
- Full Shutter press – Executes the selected Script, or pauses the running script

The following functions are available any time CHDK is loaded.

### Common to most cameras

- Half Shutter + Left – Toggle Zebra on /off
- Half Shutter + Right – Toggle OSD on /off
- Half Shutter + Up – Toggle Histogram on/off (*on recent versions Half shoot+down)*.
- Half Shutter + Down – Toggle Overrides (*Half Shutter + Left on a few models ?* )

...(Contd. P6)

**More keys and shortcuts:**

In manual focus mode - (with <ALT>)
**Up** – Set MF to infinity
**Down** – to set MF distance to hyperfocal distance (based on f /stop and zoom focal-length).
**Left** – Decrease Value Factor,
**Right** – Increase Value Factor.
**Zoom-in / Zoom-out** – can be assigned to manual focus in Main Menu > Miscellaneous stuff.

On the **IXUS / SD** series the DISP. button is used to instantly set MF (manual focus) distance to infinity.

**See:**- Extra Photo Operations Page 9.

In OSD layout editor –
**Display** (DISP. button) Change the number of pixels the OSD (on-screen display) elements are moved by.

In File Browser –
**Right** – make selection
**Left** – Open context menu.
**Zoom-in / Zoom-out** – Scroll-By-page in File Browser and File Reader modes.
**Half-shoot** – Scroll one page forward in File Reader mode.

Menu numerical units –
**Zoom-in / Zoom-out** – To enter numerical values in menus the zoom lever/switch is used to change the unit value, ie: 1, 10, 100. The unit value is indicated in the top LH corner of the OSD. When doing this, first select the menu item to be changed, then change the unit value with the zoom lever /switch, then change the selected menu item.

**SX10, SX20** (And certain other models with separate playback and record buttons ) - To turn the camera on directly into record mode, hold the On /Off button for approx. one second. When switched on, pressing the shutter button full or half will switch to record mode from playback mode.

* Cameras with a Shortcut button  can be configured in Miscellaneous stuff to use either, – Shortcut, Flash, Timer, ISO, or Video buttons to enter <ALT> mode, the Shortcut button is the default, press the button with a short momentary press, and for the original Canon function, press and hold slightly longer. - **See**: <ALT> mode button on Page 43.

When you enter <ALT> mode, the indicator " <ALT> " will appear at the bottom middle of the OSD. In <ALT> mode you can now use CHDK Scripts, and also enter the CHDK Main Menu. When you have finished customizing how CHDK operates, and/or using scripts, press the <ALT> mode button to exit <ALT> mode. You can now use the camera to take photos or video, and it's operation will be changed by the options you set in CHDK.



## Links

| | |
|---|---|
| FAQ | http://chdk.wikia.com/wiki/FAQ |
| CHDK for Dummies The Very First Steps | http://chdk.wikia.com/wiki/CHDK_for_Dummies |
| Cardtricks (Memory card formatting) | http://chdk.setepontos.com/index.php/topic,964.0.html |
| User Manual at Wiki | http://chdk.wikia.com/wiki/CHDK_User_Manual |
| Guide | http://chdk.setepontos.com/index.php/topic,1167.0.htmlß |
| Hi-Speed Shutter & Flash-Sync | http://chdk.wikia.com/wiki/Samples:_High-Speed_Shutter_%26_Flash-Sync |
| "DoF Stacking" using CHDK Focus Bracketing | http://chdk.wikia.com/wiki/DoF_Stacking |
| Grids | http://chdk.wikia.com/wiki/Grids |
| Software Overview / Link list | http://chdk.wikia.com/wiki/Software |
| UBASIC | http://chdk.wikia.com/wiki/UBASIC |
| Lua Scripting | http://chdk.setepontos.com/index.php/board,35.0.html |
| Download page for latest builds etc | http://chdk.wikia.com/wiki/Downloads |
| How To Test Your Camera | http://chdk.wikia.com/wiki/CameraFeatures |
| ALTMENGD.ZIP Text files instructions for in camera | http://chdk.setepontos.com/index.php/topic,1214.msg28449.html#msg28449 |
| Curve Anthology | http://www.curvemeister.com/support/curvemeister2/help/Articles/CurveMoves.htm |
| USB Remote Cable | http://chdk.wikia.com/wiki/USB_Remote_Cable |
| Sample photos, videos, etc. | http://wikia.com/wiki/Samples:_HDR |
| GPL License | http://www.gnu.org/copyleft/gpl.html |
| DOF Calculator | http://chdk.wikia.com/wiki/CHDK_firmware_usage/AllBest#Quick-Set_Hyperfocal_.26_Infinite_Manual_Focus_Distances |
| RAW Samples | http://chdk.wikia.com/wiki/Samples:_RAW |
| Image processing & other software | http://chdk.wikia.com/wiki/Software#CHDK_related |
| Dave Mitchell's installers, etc | http://www.zenoshrdlu.com/kapstuff/zchdkstuff.html |
| CHDK on Flickr | http://www.flickr.com/groups/chdk/pool/ |
| CHDK on Twitter | http://twitter.com/CHDKnews |
| CHDK on Facebook | http://www.facebook.com/group.php?gid=71065475036 |

**A note on the CCHDK.CFG configuration file.** This file, among other things, is where settings the user has made to the CHDK Overrides, OSD elements, etc. are saved. If this file is corrupted for whatever reason, it can cause some weird behavior from CHDK camera settings, so to test for this - find and rename the file so a new one will be created at the next startup, if this eliminates the erratic behavior the old file can be deleted. Remember though, all your personal settings will be gone. It is advisable to keep a copy of a known good CCHDK.CFG file from your camera version to use as a replacement for a corrupted one, and to add it to other SD cards for that camera, to have them ready with your preferred settings. The file is found at /CHDK/CCHDK.CFG on the SD card.

CCHDK.CFG can be edited with the application CFGEDIT – available at the CHDK Wiki.

**Exif Makers Notes.** For more accurate Exif information than is shown on the OSD for CHDK overrides, look at the Exif Makers Notes in the extended Exif information of a JPEG image. That will be the more correct information, not the abbreviated information shown in the normal Exif data.

**See:** http://chdk.setepontos.com/index.php/topic,3541.msg33201.html#msg33201

**Experimental development** is being done on the PTP feature for CHDK cameras, this will provide computer control of a camera similar to Canon's EOS Utility and Remote Capture, but with CHDK capability such as remote script control.
As at May 2010 so far the supported cameras are: (for experimental use)
A480-100b, A540-100b, A590-100e, A610-100e and 100f, A650-100d, A710-100a, A720-100c, SX1-201a, SX10-101a and 102b, SX200-100c, IXUS700/SD500-101a.

**See:-** http://chdk.setepontos.com/index.php/topic,4338.0.html (PTP Interface thread at forum)

Endnotes and References

[1] SX230HS http://www.cameralabs.com/reviews/Canon_PowerShot_SX230_HS/verdict.shtml

[2] Win1250 – East European Latin , Win1251 – Cyrillic, Win1252 – West European Latin, Win1254 – Turkish , Win1257 – Baltic

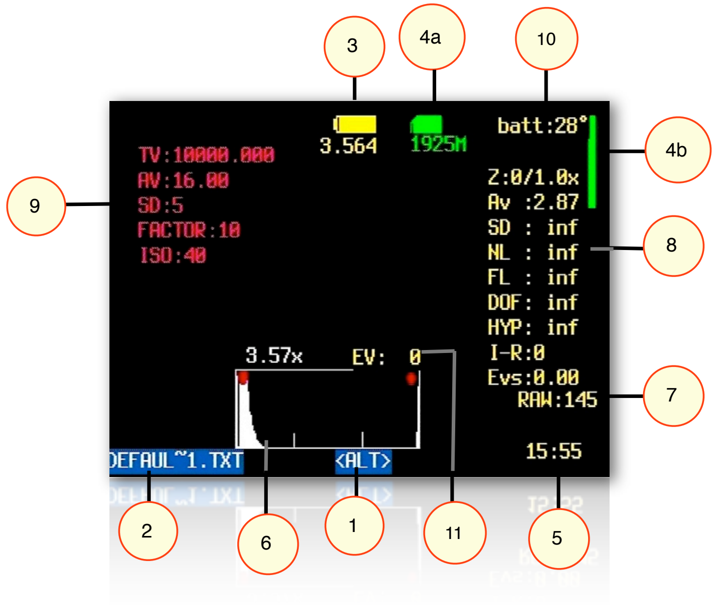
[3] Whenever a script is loaded there is extra demand for available memory, loading the default script when no other is needed may help camera performance when using CHDK.

[4] CHDK-Shell is a handy GUI for developers to easily download, compile and manage the CHDK sources on a Windows platform., it is written with AutoIt scripting language (easy to customize, the source code is included) by *whim* from the CHDK forum.

[5] Apple MacOS users - set up Image Capture preferences to open either Image Capture, Canon Camera Window, or other image management application when a camera is detected.



## On-Screen Display (OSD) Map




| | | | |
|---|---|---|---|
| 1 | <ALT> Mode indicator | 6 | Live Histogram |
| 2 | Mini Console - Current Script info. | 7 | RAW shots remaining Indicator |
| 3 | Battery Indicators | 8 | Miscellaneous Values |
| 4a | File-Space Indicators - icon/text | 9 | Extra Photo Operations - Overrides |
| 4b | File-Space Indicator - vertical bar | 10 | Temperature Indicator |
| 5 | Clock | 11 | Fast EV Switch Indicator |

**See:** OSD Parameters on Page 26 for display settings.

# Main Menu



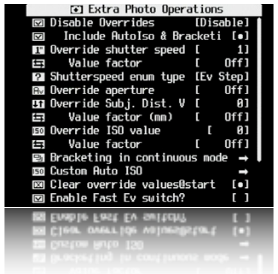

The Main Menu is the top-level menu from which all CHDK functions are enabled and customized.
To access the Main Menu, set the camera to <ALT> mode and press the MENU button.

In <ALT> mode press the camera MENU button, use the Directional & FUNC.SET buttons to navigate the menus.

Like Canon's menus, pressing the FUNC.SET button will select the highlighted menu option. Pressing the DISP. button will move back one menu level. Pressing the MENU button will exit the current operation.

## Extra Photo Operations

< Main Menu




### Disable Overrides

Allows the use of a half-press + DOWN button press to quickly toggle any override settings on and off. The status of the overrides will appear where the normal override settings are displayed in the OSD - in your chosen warning color -

(**See:** "Visual Settings" Page 35)

- **Off -** Turns off the "Disable Overrides" shortcut option.
- **On -** Starts out with any override settings DISABLED. In the OSD you will see - "NO OVERRIDES"
- **Disable -** Starts out with any override settings enabled.

  The "On" and "Disabled" options allow you to use this feature in your User Menu (P27) as the quick override toggle instead of using any shortcut key. Some cameras may not have the shortcut feature available.

- **Include AutoISO & Bracketing** Enable [●] / Disable [ ]

Includes Auto ISO and Bracketing settings in the "Disable Override" settings. If not enabled then the Auto ISO and Bracketing settings will not be turned on or off by the "Disable Override" shortcut button.



**Q. What's the future for CHDK ?**

A. There's no doubt that clever people will continue to develop more features, scripts, etc., and more cameras will be ported, CHDK will be refined, until it is released as v1.0, and perhaps beyond, which seems to be very close, so the future looks good for CHDK. This User Guide has been written up to December 2011. For further firmware revisions refer to the changelog. Have fun with and enjoy CHDK !

**See**:- http://chdk.wikia.com/wiki/Changelog

**Want to have a say?**, then go to :- http://chdk.wikia.com/wiki/Talk:CHDK (Discussion at the CHDK wiki, or go to :- http://chdk.setepontos.com/ (The official CHDK forum - English, - other language forums links available at the Wiki homepage - http://chdk.wikia.com/wiki/CHDK).

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## Miscellaneous info.

**CHDK supported cameras** might not always perform as a menu entry might imply, because you can enter a parameter does not mean the camera can necessarily perform the task, the cameras have hardware limits that restrict them. (some have less than others)

**Extra long exposure capability** is not yet available on all CHDK cameras, the cameras listed below are supported at this time. (May 2010)

A30, A540, A550, A560, A570, A590, A630, A710, G9
IXUS70/SD1000, IXUS80/SD1100, IXUS870/SD880, IXUS90/SD790, IXUS950/SD850, IXUS970/SD890, S3, S5, SX1, SX10, SX200, D10 (Dec '11).

Extra long exposure means these cameras are capable of exposure times of up to 2000 seconds, helpful for Astrophotography and other specialized applications.

**CHDK Cameras without standard manual focus**, can take advantage of the CHDK focus override, All of the IXUS series (except IXUS980/SD990), and these others at this time - (May 2010) - A450, A460, A470, A480, A550, A560, A2000, TX1.

**Cameras without an actual aperture/iris** mechanism use the ND (neutral density) filter to achieve an exposure method similar to an actual aperture. CHDK provides control of the ND filter for users to make their own shutter speed adjustments. The CHDK supported cameras listed below have an ND filter only, and no actual aperture/iris mechanism.
IXUS series (except IXUS 300), A450, A460, A470, A480, A530, A550, A560, A2000, TX1.
Some high end Powershot cameras, such as the G series, have both an aperture and an ND filter.

**Commonly seen when checking the camera version** with the VERS.REQ method, is the E18 error, this means sometime during the camera's life it has encountered a possible malfunction of the lens assembly, if the camera is working ok there is no cause for concern.

performed by an authorized Canon Repair Facility, would void the warranty." ... and ... In further discussion with Canon about this specific hack, their response is: "If it is not Canon firmware the warranty would be void." Is it an "upgrade" of the camera firmware when the firmware remains untouched? It's up to you to decide. Don't use it if you are not willing to take the slightest chance. Many, many people have used CHDK on their cameras (including some very experimental versions) and there is no confirmed report of any permanent malfunction. Thus, CHDK appears to be quite safe to use as long as you make sure that it's the CHDK and not a real firmware update (A real firmware update which is not an official Canon update could alter or completely ruin the camera and will void the warranty). Addressing their second comment (i.e. "if it is not Canon firmware") - CHDK is NOT firmware, by very definition, FIRMware is software that remains in the memory of the device when it is not using any power source.

However, this is not a legal opinion and the user accepts all risk of using it. And as a practical matter, if you send your camera in for warranty service, and Canon says your warranty is void because they found evidence of CHDK on your memory card, there is not much you can really do (what are you going to do? Spend thousands of dollars suing them to get your camera repaired?) However, you can just wipe or remove the card. ;)

**See:-** http://forums.dpreview.com/forums/readflat.asp?forum=1010&thread=23168653&page=2

More at: - http://chdk.wikia.com/wiki/FAQ

**Q. How do I use scripts?**

A. CHDK allows you to automate your camera by running "scripts", small and simple programs written in a short-hand version of BASIC, or Lua. You can use some pre-made scripts like bracketing, intervalometer etc., or write your own scripts using the scripting language. To use a script, you have to do this:

1 - Put the script you want to use into the CHDK/SCRIPTS-folder on your SD card
2 - Load the script (Main menu>Scripting parameters>Load script from file) and adjust script parameters as needed...
3 - To run the script, press the shutter button while in <ALT> mode. You can also stop it by pressing the shutter button again.

If a script does not work properly, try to increase the "script shoot delay" parameter, which is a small time-delay after a shot is taken, before the next line of the script is executed. Some scripts also may require certain camera settings. For example the generic bracketing script: go to MENU > Review and switch it to "off". Use P, Tv, Av or M mode and activate the camera function where you want to have bracketing.
For example: Activate the focus slider when you want to have focus bracketing. Activate the exposure compensation slider in P mode when you want to have exposure bracketing, and so on.

For more, go to:- Scripting notes Page 57,
and http://chdk.wikia.com/wiki/UBASIC/TutorialScratchpad

**Q. May I suggest a new feature?**

**A.** Yes you certainly can, although not every wish can be fulfilled. Please note that the CHDK is not able to change any standard behavior of the camera, because it does not modify the original firmware. CHDK can just "extend" current functionality.

**See:** *Feature requests* at the CHDK Forum.



## Override shutter speed [0 – 100] <Extra Photo Operations < Main Menu

TV in the OVERRIDES display in the OSD. This feature allows you to override the camera's shutter speed in all auto and manual modes with the speed you select. This feature allows shutter speeds as long as 64 seconds, (or longer if your camera has CHDK Extra Long Exposure support) and as short as $1/100,000^{th}$ of a second, in $1/3^{rd}$ EV steps. This setting is affected by the "Value factor" and the "Shutter speed enum type" settings below. Please note that the actual speeds available are dependent on the camera used and other conditions such as the aperture setting.

- **Value factor** [Off, 1/100k – 100] or [Off , 1,10,100]

  Enables the Override shutter speed and sets the Value factor, the use of which is described below.

- **Shutterspeed enum type** [Ev Step , Factor]

  Select the method of determining the override shutter speed.

  **Ev Step** – The method most of us will use. Enables the first set of options above.
  The Override shutter speed is shown in seconds. Select the desired shutter speed and set the Value factor to 1 to enable the override function.
  **Factor** – This method will enable the second set of options above.
  The shutter speed is determined by multiplying the selected value factor with the selected shutter speed. This method is useful in analytical and research photography.

## ND filter state [ Off / In / Out] (For cameras with an ND Filter)

When the camera detects a really bright scene, it will swing the ND filter inline with the lens and sensor. This makes the scene look darker and will affect the exposure (but not depth of field like a real aperture / iris would). With the ND filter in, the camera can select a slower shutter speed without over-exposing the entire scene. Also, with the ND filter swung in, the camera will capture an image with an aperture of f/8 - This is an artificial aperture value caused by the ND filter swung in. With CHDK, you can choose to keep the ND filter out, and just select a faster shutter speed to compensate. To do this, Select one of the options from -

- **'Off'** means the camera will automatically control the ND filter state.
- **'In'** means the ND filter is swung in.
- '**Out'** means the ND filter is kept out.

## Override Aperture [Off , 2.77 – 16.00] <Extra Photo Operations < Main Menu

For cameras with an actual aperture/iris. mechanism (IXUS / SD models have ND filter).
AV in the OSD. This feature allows you to override the camera's aperture settings. Simply select the desired aperture setting and the camera will use that setting in all auto and manual modes. **Please note** that the actual aperture values available depend on the camera.

## Override Subj. Dist. Valu [0 – 65535]

SD in the OVERRIDES display in the OSD. This feature allows you to specify, to the millimeter, the manual focus distance. To focus the camera at the override distance you must half-press the shutter.

- **Value factor (mm)** [Off, 1, 10, 100, 1000]

FACTOR in the OVERRIDES display in the OSD. The Value factor is used to enable the "Override Subj. Dist Valu" (OSDV), and also to quickly set the focus distance. When updating the "Override Subj. Dist. Valu" with the left/right buttons, the value will be changed by the amount set in the "Value factor." So "1" changes the OSDV by 1 mm, "10" changes by 10 mm, and so forth. In this way the OSDV can be updated faster than trying to change the override from 1 to 450 mm by pressing the rocker 449 times.

For cameras without Manual Focus, (IXUS/SD series, and some A series) SD Overrides can be used to manage focusing, either by entering values in this menu, or by using shortcut keys. Enter a choice of unit value, either 1, 10, 100, or 1000, this will change the Subj. Dist. Value by the unit value you entered, ie: if the Value factor is 10, and the Subj. Dist. is 10 then the focus will be 10 x 10 = 100 mm from the lens.

These Manual Focus adjustments can also be achieved with shortcut keys. In <ALT> mode, using the Left/Right keys to adjust the Value Factor and the Zoom lever to adjust the Subject Distance, (or on cameras without a zoom lever use the Display (DISP.) button) Infinity is immediately selected by pressing the Up key, and for Hyperfocal adjustment based on current F-stop and zoom focal length, press the Down key. The subject distance values are displayed as part of OVERRIDES on the OSD. Remember to exit <ALT> mode to shoot pictures with these adjustments applied. Also remember to uncheck "clear overrides @ start" setting if you want to continue with the current settings.

## Override ISO value [0 – {ISO max for camera}]

ISO:.. in the OVERRIDES display in the OSD. This feature allows you to override the camera's ISO setting. Select the desired ISO setting and the camera will use that setting in all auto and manual modes.

- **Value factor** [Off, 1, 10, 100]

The factor is used to enable the ISO override, and to set a multiplier against the "Override ISO value" set above. So if you want to use an ISO of 1200, you would set the "Override ISO value" to 12, and the "Value factor" to 100. This arrangement exists to speed the setting of a custom ISO.

**Note:** Although CHDK may show a higher or lower setting, minimum and maximum ISO overrides will mainly be determined by the camera hardware limits, CHDK enables "fine tuning" of ISO settings, **See:** Custom Auto ISO on pages 12, 13.

**See**:- Exif Makers notes at Miscellaneous Info.

**Also**:-
OSD Parameters on Pages 26, 27, and 28 for "Show State Displays" of overrides in the OSD.



# FAQs and Facts

**Q. Can CHDK damage your camera ?**

**A. Short answer**: It is unlikely, but theoretically possible. CHDK comes with no warranty for any use; you use it at your own risk. CHDK is created by reverse engineering an undocumented system that directly controls hardware. Because of this, it is impossible to be certain that it is completely safe.

**Long answer**: It is very unlikely that CHDK will permanently harm your camera. There have been no confirmed reports of CHDK damaging a camera, and both the original firmware and the CHDK developers take precautions to avoid situations where this could happen. There are at least two ways in which CHDK could theoretically do damage:-

1). By commanding physical hardware to do something it was not designed to do. For example, it is possible to command the lens hardware to move when the lens is closed. (1) It is also possible to move lens hardware beyond limits allowed by Canons firmware, using scripts or overrides. See UBASIC/Scripts:_Tele-Macro-Mode (2) and Talk:UBASIC/Scripts#Tele-Super-Macro_Mode_Comments (3).

2). By overwriting the internal flash ROM where the Canon firmware is kept, rendering the camera un-bootable. Since CHDK does not ever intentionally write to internal flash, it would take an extremely unlikely sequence of events to make this happen.

It's worth noting that neither of these cases have resulted in actual damage, and both required direct input from the user.

If you are concerned about this, you can minimize your risk by avoiding untested development builds (such as the autobuilds, or test builds posted on the forum) and being careful about what scripts you run.

1. http://chdk.setepontos.com/index.php/topic,2335.0.html
2. http://chdk.wikia.com/wiki/UBASIC/Scripts:_Tele-Macro-Mode
3. http://chdk.wikia.com/wiki/Talk:UBASIC/Scripts#Tele-Super-

**See**: http://chdk.wikia.com/wiki/FAQ

**Q. When I switch off my camera and then switch it on again, the CHDK program does not work, What's wrong?**

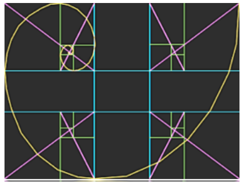
**A.** When you update your camera with CHDK, it doesn't actually change the firmware. Because it is just a memory-resident program, it only remains in the camera's memory until the camera is turned all the way off. So, if something goes wrong and camera does not respond, you can always switch the camera off (or remove the battery, and perhaps delete it from the memory card) to return to the original firmware.

**See**:- http://chdk.wikia.com/wiki/FAQ

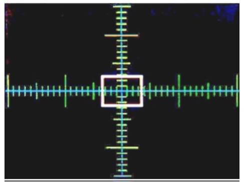
**Q. Does using the CHDK program void your warranty?**

A. Please bear in mind that CHDK comes with no warranty for any use; you use it at your own risk. What follows is just a few thoughts, and is not a legal opinion. Many believe that using the CHDK does not harm your warranty, since it is said to be loaded into the memory only temporarily (turn off the cam and it's gone completely) and that it leaves the original camera firmware untouched. Canon Tech Support *says: "Unfortunately, any upgrades to the software of the camera not

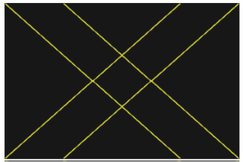
## Grids



Golden Ratio



Rulers



Diagonal Method

## Stereo Data Maker



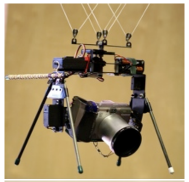




Photos courtesy of Stereo Data Maker http://stereo.jpn.org/eng/sdm/index.htm

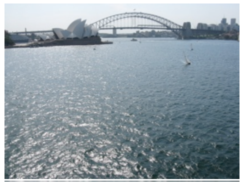
## KAP

(Kite Aerial Photography)



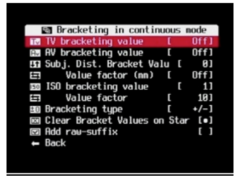
Courtesy Tom Benedict







## Bracketing in continuous mode < Extra Photo Operations < Main Menu




Bracketing is the practice of making several exposures of a scene, with each exposure differing from the next by predetermined steps in exposure or focus settings. Bracketing is used to easily capture a range of exposures so that the best exposure can be selected at a later time. Bracketing is also used to create a series of exposures which will be combined using methods such as HDR processing.

*The bracketing features are enabled when the camera drive mode is set to continuous, and custom timer with some models.*

Usage Tip: If you wish to fire off individual frames and still have bracketing for each one, after the first shot lightly let-up on the shutter button to a half- press position. The next full-press will give you another bracketed shot. This process can be repeated for as many bracketing steps as you need. Giving you finer control over the number of bracketed exposures you may require.

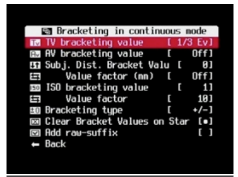



Set camera Custom Timer in Canon Menu

**See:** Bracketing notes: Page 49.

- **TV bracketing value** [Off, 1/3 – 4 Ev]

Set this value to bracket via exposure time. A value of 1 will double or halve the exposure time for the following exposures.




- **AV bracketing value** [Off, 1/3 – 4 Ev]

Set this value to bracket via aperture. A value of 1 will open or close the aperture by 1 stop for the following exposures.

- **Subj. Dist. Bracket Value** [0 – 100]

Set this value to enable focus bracketing. This feature is only enabled during manual focus mode on some versions. It allows you to specify the manual focus distance in millimeters. This value is multiplied by the Value factor below to arrive at the final value.

- **Value factor (mm)** [Off, 1, 10, 100, 1000]

Used as a multiplier for Distance bracketing value.

- **ISO bracketing value** [0 – 100]

Set this value to bracket via ISO. This value is multiplied by the Value factor below to arrive at the final ISO value that will be used for bracketing. A value of 2, with a Value factor of 10, will increase or decrease the ISO by 20 for following exposures.

- **Value factor** [Off, 1, 10, 100]

Used as a multiplier for the ISO bracketing value.

- **Bracketing type** [+/-, –, +]

With all bracketing types the first exposure uses the current exposure settings of the camera. On following exposures the exposure settings are adjusted as described below.

**+ / –**

This bracketing type will alternatively apply the bracketing value by first subtracting then adding. The sequence goes like this…
0 Ev, -1Ev, +1Ev, -2Ev, +2Ev, -3Ev, +3Ev, etc. Bracketing will continue until you release the shutter. So for example lets say you set the TV bracketing to "2 Ev", and when you half-press the shutter you notice an exposure time of 1 second. When you fully depress the shutter you will get exposures at these times: 1 sec, ¼ sec, 4 sec, 1/15 sec, 15 sec, 1/60 sec, 15 sec, 1/250 sec, 15 sec, etc.

**–**

This bracketing type works as above but will only reduce the exposure value. Using the above example, the exposure times would be 1 sec, ¼ sec, 1/15 sec, 1/60 sec, 1/250 sec, etc.

**+**

This bracketing type works as above but will only increase the exposure value. Using the above example, the exposure times would be 1 sec, 4 sec, 15 sec. Once the camera's limit is reached, subsequent exposures will occur at the maximum (or minimum) setting.

- **Clear Bracket Values on Start** Enable [●] / Disable [ ]

Enable this option to turn off bracketing when the camera is turned off.

- **Add raw-suffix** Enable [●] / Disable [ ]

In bracketing mode you now have the option to add a suffix to the raw filename, so that later you can easily identify the RAWs that were created during bracketing, it is disabled at default.

## Custom Auto ISO < Extra Photo Operations < Main Menu

This feature has 2 purposes: Allow the user to define the exact ranges of ISO used in Auto ISO and Auto-HI. As an example: Expand the Auto ISO range from 80-200 to 50-400. Give additional information to the camera to allow it to select the optimal shutter speed (to avoid blur or get the right artistic exposure) and ISO instead of some sub-optimal default...

As an example - Use a faster shutter and higher ISO when shooting sports, but go for a slower



### HDR Panorama



**The British Columbia Parliament Buildings in Victoria, BC** -

located at 48°25′13.4″N, 123°22′11.1″W]]

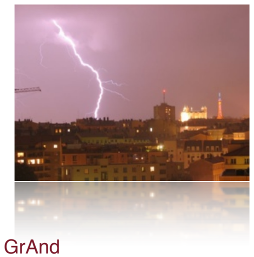
This file is licensed under Creative Commons Attribution 2.5 License
In short: you are free to distribute and modify the file as long as you attribute it's author(s) or licensor(s).
Attribute to Ryan Bushby
Source:
http://commons.wikimedia.org/wiki/Image:British_Columbia_Parliament_Buildings_-_Pano_-_HDR.jpg

This image was created by stitching together 20 sets of HDR images each created from 3 exposures. This makes for a total of 60 photographs used to create this image. I used CHDK to allow for the taking of several bracketed shutter speed exposures without re-metering in between.
The final image is 35 mega-pixels. The whole process is described here:-

http://wiki.highinbc.yi.org/index.php/OffTopic:Photography/BC_Parliament_Buildings_HDR_mosaic

### Motion Detect





From GrAnd

### Fast Shutter



Courtesy of kittenmoon

## HDR



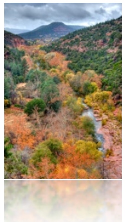




## HDR from a single RAW







*Note: The examples above are copyright ©, they remain the property of their respective owners and are not for commercial use. Thanks to the owners for use in this User Guide.*

**See:-** http://www.flickr.com/groups/hdr/pool/

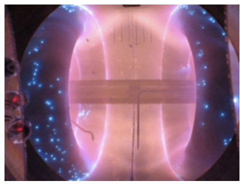
HDR (High Dynamic Range) is a popular branch of photography gaining acceptance over the last few years particularly. CHDK has made this much easier for the low end because of RAW capture (HDR from a single RAW), and bracketing (Multiple shots with stepped Tv, etc).
There are now many applications that are capable of HDR processing, including Photoshop .

## High Altitude



From FBonomi
Italy from 39.5 km altitude

## Ultra High Speed Shutter



From Princeton University USA,
Helium Plasma research, at ~80 microseconds

Recently (Late 2010), Canon has produced the G12, and S95 Powershot cameras with HDR processing in camera, which is done by producing 3 bracketed shots of a scene at different exposures, then combining them in camera to create one HDR image, does this sound familiar ? … And in 2011 the SX40HS has exposure *and focus* bracketing, and NightScapes mode to *combine several images* to reduce digital noise at high ISO.



shutter and minimal ISO when shooting still landscapes) Method - The camera will try to maintain lowest ISO as long as shutter speed is no-slower than user defined (more below). Custom Auto ISO will kick-in whenever ISO HI/Auto ISO is chosen. This allows a quick manual override by choosing a specific ISO value.

**Example:** Camera set ISO 100 at 1/8s. Auto ISO configured to ISO50-400 at 1/15s: Auto ISO will shift to ISO200 to maintain 1/15s shutter speed.
This feature is available in all modes except for Shutter priority (Tv). It is also disabled in stitch assist to prevent using different settings for each panorama part.




- **Enable Custom Auto ISO** Enable [●] / Disable [ ]
  This is the master switch for this feature.
- **Minimal Shutter Speed** [Auto 1/8 -etc]
  Here you have basically two options:
  **1) Auto** - This is for use when photographing still-life, landscapes, etc. It will use the factors below to prevent camera shake, but will assume the subject holds still.
  **2) Numerical setting** - hint to the camera what the optimal shutter speed is for the subject you are photographing.
  The camera will try to use this value or a faster one as much as possible (to prevent blur), e.g:
  **1/8s - 1/30s** - Slow moving subjects.
  **1/60s - 1/125s** - Kids, Pets, general movement
  **1/250s - 1/1000s** - Sports, Fast action
- **User Factor** (1/FL/factor)
  This setting accounts for the user's ability to hold the camera steady. It is based on the old rule that the shutter speed should be no less than 1/focal-length. Start by dividing the effective focal length of the lens by the actual focal length. The answer is generally somewhere around 6. Then increase or reduce this amount by a self-assessed value of your steadiness. If you think your hands are steadier than average then decrease by 20%. If you think you're shaky then increase by 20%.
- **IS Factor** (Tv*factor)
  In determining the ISO setting, the effectiveness of the IS system will be taken into account. Use a setting of 4 if the IS is effective enough to give you a two-stop reduction in shutter speed. Use a setting of 2 if the IS isn't very effective, or 8 if the IS is very effective.
- **Max ISO HI** (x10)
  Sets the maximum "HI" ISO that the camera can select.
- **Max ISO Auto** (x10)
  Sets the maximum "Auto" ISO that the camera can select.
- **Min ISO** (x10)
  Sets the minimum "Auto" ISO that the camera can select.

### Clear override values@start Enable [●] / Disable [ ]

Extra Photo Operations overrides will be cleared for the next time the camera is started.

## Enable Fast EV Switch?   Enable [•] / Disable [ ]

***Warning**: This feature is not properly workable on all cameras yet.*

**See**: http://chdk.setepontos.com/index.php/topic,2595.msg24211.html#msg24211
**and**: http://chdk.setepontos.com/index.php/topic,2501.msg23321.html#msg23321

Turns the UP and DOWN buttons into quick EV compensation buttons. You no longer have to press the FUNC.SET or MENU buttons to adjust your EV settings while shooting. By pressing the UP or DOWN buttons the EV is increased or decreased. There is also a screen display❶ showing your chosen EV-compensation settings by whatever step-size you have chosen (see **Step Size (1EV)?)** below). It is advisable to move the OSD EV override display❷ over the camera's own to prevent confusion.
You will see a real-time change in the EVF/LCD as you change your EV values with this short-cut. It also works while the Zebra Mode is engaged. You can fine-tune the Zebra alert just by pressing the UP and DOWN buttons with half shoot.
When used in conjunction with the Curves "Auto DR" Mode you should never miss another blown highlight or dropped shadow again.

***One drawback***: If using the up and down buttons during a half-press to see Zebra alerts while changing the EV setting, it will toggle your "Disable Overrides" on and off if you have that feature engaged as well. A small price to pay for the ability to have these amazing features. One work-around, set the EV step-size to 1/2 what you normally would use, then the "Disable Overrides" shortcut will always toggle back to the original ON (or OFF) on every 2nd EV +/- press, effectively resetting it where you wanted it in the first place.

**Note also:** This change is not saved between camera power-downs. If you would always like to start out with a small negative preset EV value to avoid blown highlights, then use Canon's own EV compensation setting for your startup EV value. This Fast EV Switch will reflect that value on startup.

❶: Enabled when Fast EV Switch is enabled.
❷: Use OSD parameters > OSD layout editor to move display.

- **Step Size (1EV)?** [1/6 Ev, 1/3 Ev, 1/2 Ev, 2/3 Ev, 5/6 Ev, 1Ev, and on - ]

  When using the Fast EV shortcut feature you can adjust how much you want to change the EV compensation with each UP or DOWN keypress. Step size is increments. A major improvement over the adjustment levels and steps in the original firmware.

## Force manual flash   Enable [•] / Disable [ ] < Extra Photo Operations < Main Menu

For optional control over camera flash output, use with Power of flash [ 0, 1, 2 ] to give 3 separate steps up in flash output power.

- **Power of flash** [ 0, 1, 2 ]

  Used with Force manual flash to adjust flash output.

  0 = Low, 1 = Medium, 2 = Very High

  More at:- Flash notes, and Force flash pics. on page 59

## Quality override [ Superfine, Fine, Normal, off ] < Extra Photo Operations < Main Menu

For recent camera versions without Canon Superfine setting (SX200, SX20, etc)
Canon setting is used when “off” is selected, settings are saved in CCHDK.CFG



## Flash notes

**Notes on Force flash:** From ***PhyrePhoX***, for strobists - an option to manually override flash (for all cameras), even for (IXUS / SD cams, no need for a script anymore. **Important:** when enabled, this will not only override flash power, but also enable the CHECK if flash is needed, in other words your camera will use flash even in bright sunlight and even if you disabled the flash, of course the flash will not fire on cameras with popup flashes when the flash is not popped up. There are three values for the flash to be set - low, middle and POWERFUL, be careful, don't flash at home kids.... This feature more or less created - by ***ewavr***, and code from ***PhyrePhoX -*** thanks.
For cameras with dedicated movie buttons, there is an extra menu item - Force flash only in moviemode, when this is checked, the Force flash feature will be enabled for taking photos when recording a video.

**Note:** There is another advantage by using force flash - On cameras with adjustable flash intensity there will not be a pre-flash when the intensity is set manually, which will help greatly when using slave flashes.

**See:–** http://chdk.setepontos.com/index.php/topic,1365.msg39384.html#msg39384

and:- Force flash pics. - below

---

## Examples

### Force flash pics

Pics thanks to *walqas*



Manual flash: low power (0)



Manual flash: medium power (1)



Manual flash: high power (2)



Manual flash: Camera

```
@default g 8
  @param h Reg Mode(0-no,1-incl,2-excl)
  @default h 0
  @param i Measure Mode (1-Y,0-U,2-V)
  @default i 1
  @param j Burst/Preview (sec,0=off)
  @default j 0

 if a<1 then a=1
  if b<1 then b=1
  if c<0 then c=0
  if g<1 then g=1
  if f<1 then f=1
  if j<0 then j=0
  e=e*100

  j=j*1000
  print ">[";a;",";b;"] threshold: ";c
  x=30000
  if j>0 then goto "md_burst"
  :md_singleshot
    press "shoot_half"
    t=0
    do
     md_detect_motion a, b, i, x, d, c, 1, t, h, 1, 1, a, f, 0, g, e
    until t>0
    click "shoot_full"
    goto "md_singleshot"
  :md_burst
    press "shoot_half"
    t=0
    do
     md_detect_motion a, b, i, x, d, c, 1, t, h, 1, 1, a, f, 0, g, e
    until t>0
    press "shoot_full"
    let X=get_tick_count
  :contloop
  let U=get_tick_count
  let V=(U-X)
  if V<j then goto "contloop"
  release "shoot_full"
  goto "md_burst"
```

---

This is an example script for study, please do not copy from here as it may not be exact.

http://chdk.wikia.com/wiki/UBASIC/Scripts:Lightning_script_--_Fudgey

**See:-** FAQ-How do I use scripts? Page 64

and:- Scripting Tutorial Page - http://chdk.wikia.com/wiki/UBASIC/TutorialScratchpad

also:- http://chdk.wikia.com/wiki/UBASIC/Scripts

**Tip**: For using intervalometer, and long exposure scripts - to save battery and LCD use a piece of ⅛ round plastic / unconnected a/v cable in the camera video transfer port and LCD will be off, although not as much saving as when display is turned off (Which may not be possible with some other settings).

---



## Video Parameters

< Main Menu




### Video Mode [ Bitrate or Quality ]

Video compression modes.

**Bitrate –** dictates a constant data rate. Video compression (and hence, video quality) expands or contracts as necessary to maintain the data rate constant.

**Quality** – Sets a constant compression level, ensuring a defined level of quality regardless of how much data that level requires.

**Note:** From owners reports of testing Quality overrides, it is evident that settings above the standard Canon setting gain little if any higher quality, however file sizes will increase significantly. Lower settings (minor), will lose little in quality but will reduce file size.

**Excess** Bitrate and Quality settings can cause memory buffer overload, and stop recording, a red **!** will show on the OSD.

### Video Bitrate [ 0.25, 0.5, 0.75, 1, 1.25, 1.5, 1.75, 2, 2.5, 3 ]

The compression factor for Bitrate compression. 0.25 is the most compressed / least quality and 3 is the least compressed / best quality.

### Video Quality [ 1 - 99 ]

< Video Parameters < Main Menu

The compression factor for Quality compression. 1 is the most compressed / least quality and 99 is the least compressed / best quality. (Roughly ~70 - 80 is Canon equivalent).

### Clear Video Params on Start? Enable [•] / Disable [ ]

When enabled this will clear all your custom video compression settings back to the camera's own defaults on startup.

### Fast Video Control Enable [•] / Disable [ ]

< Video Parameters

Only a few cameras are supported. Pause and unpause video by pressing LEFT / RIGHT while recording. **Note:** When using this function the remaining video-record time calculation is reset, so the change is shown immediately in the OSD.

### Video Quality Control ? Enable [•] / Disable [ ]

When enabled, using the UP / DOWN button will increase or decrease video quality *or* bit-rate (depends on which one is enabled in the Video Mode override) - *While* you are recording.

### Enable Optical Zoom Enable [•] / Disable [ ]

< Video Parameters

This feature allows you to use the camera's optical zoom during video recordings.

### Mute During Zooming Enable [•] / Disable [ ]

To eliminate focus mechanism noise. Please note that the zoom mechanism sound is very loud in video, which is probably why it was disabled by the manufacturer.

### AF key

< Video Parameters < Main Menu

(Shutter button - half press, or FUNC.SET button) During video recording - camera makes a single autofocus scan.

**Show Remaining Videotime** [ Don't, hh:mm:ss, KB /s, both ] < Video Parameters

Displays a position-able OSD element to show the video bit-rate, and the remaining video recording-time, on the SD card,…

- **Don't** - No display of remaining recording time and/or video data-rate.
- **hh:mm:ss** - Display a clock of remaining video-recording time left.
- **KB/s** - Display video recording bandwidth (data-rate) in Kilobytes per Second.
- **Both** - Display remaining video-recording time in both hours/mins/secs, and video data-rate in Kilobytes per Second.

- **Refresh Rate (~sec)** < Video Parameters < Main Menu

  Due to the nature of video's variable bit-rate and compression methods, subject dependent, the "Show Remaining Videotime" has to be updated regularly by re-polling the card-space and the bit-rate to calculate a fairly accurate time-remaining estimate. Choose, in seconds, how often that you want this Video-Recording time-remaining to be updated. Shorter periods of time are less accurate from each on-screen update to the next.

## RAW Parameters < Main Menu




### Save Raw Enable [•] / Disable [ ]

Enables the saving of RAW files. Enabling RAW does not disable JPEG, both are saved. Also required for saving DNG.

(See Page 5 for RAW toggle shortcut button)

**Note:** By not allowing a camera to auto-focus, ie: pressing the shutter all the way too fast, the camera might not save a RAW image.

### Exceptions < Raw parameters < Main Menu

- **Disable @ Video Record?** Enable [•] / Disable [ ]

  Some cameras, the S-Series in particular, have a dedicated "Video Record" button where you can engage that and also shoot individual still-frames during video recording. It was found that RAW file-saving can interfere in this process. Turning this option on will ensure that you don't miss a shot or video.

- **Disable RAW @ Sports** Enable [•] / Disable [ ]

  Disable RAW saving when the Mode-Dial is turned to Sports Mode. This ensures that fast action sequences won't be missed due to RAW file-saving time, when forgetting to disengage the RAW feature.

- **Disable RAW @ Burst** Enable [●] / Disable [ ]

  Disable RAW file-saving when using burst mode. Again, a handy override for when RAW is not needed during fast burst-sequence shots (RAW enabled would certainly increase time between shots)

- **Disable RAW @ Timer** Enable [•] / Disable [ ]

  Disable RAW file-saving when using the camera's Custom Timer mode (similar to the safety feature for the burst mode).



## Scripting notes

Well! where do we start, it is well known that Scripts and Scripting deserves a manual of it's own, but for this limited size User Guide we will have to be content with a very brief overview.

**Definition of a Script:** A simple program in a utility language, another term for macro or batch file.
In computer programming, a computer script is a list of commands, or instructions, that are executed by a certain program or scripting engine. They are usually just text documents that contain instructions written in a certain scripting language (ie: uBASIC, Lua). This means most scripts can be opened and edited using a basic text editor. However, when opened by the appropriate scripting engine, the commands within the script are executed.
In CHDK, scripts are used to automate a command or multiple commands to the camera in order to have the camera perform certain actions, ie: to hold the shutter open for a particular length of time, or to force a particular Av or ISO setting, (and many more actions). Nearly anything you can do by pressing buttons on your camera with your own fingers, you can also do automatically with these script commands. Note also that many scripts are universal for all relevant cameras, while others are camera model specific. Inventive script programmers, the experienced, and the not so experienced, have been active from the beginning of CHDK, with many short and simple, and also the more complex scripts being made freely available to the CHDK community. Scripts such as: motion detect, time lapse.

**Here is an example script -**

### UBASIC/Scripts: Lightning script -- Fudgey

**Written for/on:** Powershot S5 IS

**Also works on:** A540, A550, A590 so far.

**Doesn't work on:** A720 IS and some others.

This is basically a very fast and responsive motion detection script. This will definitely solve your problems if you want to catch lightning, (thus the title) or anything fast, however some objects will blur when the light conditions are insufficient. Enjoy this script!

**Script Code** (save as "Lightning script.bas" to your /CHDK/SCRIPTS/ folder)

```
--------------------------------------------------------------------------------
  rem Author: fudgey - based on BarneyFife's MD Lightning6 and MLuna's Motion Detect
scripts
  rem Tested on A570IS, Allbest build 16
  rem For bursts, set the camera in continuous shooting mode and set j>0
  rem If j>0 in single shot mode, you will see your shot for j seconds on screen.
  @title Fast MD with Burst/Preview 080205
  @param a Columns
  @default a 6
  @param b Rows
  @default b 4
  @param c Threshold (0-255)
  @default c 10
  @param d Compare Interval (ms)
  @default d 1
  @param e Trigger Delay (0.1 sec)
  @default e 42
  @param f Rows to Exclude
  @default f 0
  @param g Pix-Step(speed/accuracy adj)
```



Home made switch using a keychain light.

A range of some available devices to buy.



Check the extensive forum thread:-

http://chdk.setepontos.com/index.php?PHPSESSID=7973386aacdc6fb7e1b409702af56bbb&topic=294.0

**Enable built-in CHDK remote support**

First, ensure you are running a reasonably up-to-date CHDK build. Some early builds did not support remote shutter release control via USB, and some only by script.
Now enable remote support via the CHDK menu: Main Menu > Miscellaneous Stuff > Remote Parameters > Enable Remote

**Note**. If you enable the "Sync Delay" then the shutter will release *after* you stop the voltage to the USB port. This was done because it was found to sync the shutters on 2 cameras for stereo imagery is much better as the voltage drops. (It can also be useful if a switch has poor-quality contacts, in which case the rise in voltage when it closes may not occur quickly enough to trigger CHDK's remote function.) Under most single-camera circumstances, however, you won't need this unless you need to sync the shutter release more accurately to the voltage trigger signal for specialized reasons.

**Also note:** When downloading images to computer with USB it will be necessary to uncheck "Enable remote" in Scripting Parameters - [ ]

**And see:** Downloading via USB, on page 46.

---

## Grids notes

Grids are an overlay for the EVF / LCD display that can help you with composition, cropping, subject / image alignment, and other novel things. Normally most cameras only offer you one simple option, a "Rule of Thirds" composition grid, but with CHDK the sky is now the limit on what you want displayed on your viewfinder for these handy photographer's tools.

You can Load and run the Grid files from "OSD Parameters" > "Grid" > "Load Grid from File..." When not in <ALT> mode you can quickly turn the Grid Overlay (and all other CHDK OSD elements) on or off with a simple Half-Shutter-Press + Right-Navigation button combination.

Or put the "Grid" > "Show Grid Lines" menu toggle on your fast-access Custom User-Menu if not wishing to turn off all of CHDK displays.

**See**:- Grid Tutorial & User Contributions **See also**: Grids Pics - Page 62.

---



- **Disable RAW @ EV Bracketing** Enable [•] / Disable [ ]
  Disable RAW file-saving when you are using any of the high-speed bracketing features.
- **Disable RAW @ Edgeoverlay** Enable [•] / Disable [ ]
  Disable RAW saving while using Edge overlay.
- **Disable RAW @ Auto** Enable [•] / Disable [ ]
  Disable RAW saving while using Auto shoot mode.
- **Warn when Exception?** Enable [•] / Disable [ ]
  Displays a "RAW Disabled" OSD warning in a selectable color when any of the RAW File-Saving Exceptions are enabled and RAW file-saving is turned on.

### Dark Frame Subtraction < Raw parameters < Main Menu

Controls the application of the Dark Frame Subtraction feature of the Camera to a RAW shot. Dark Frame Subtraction is a function used to reduce the effects of sensor noise when the exposure time is 1.3 seconds or longer.

- **Auto** – Performs a DFS on exposures 1.3 seconds or longer.
- **Off** – Never performs a DFS.
- **On** – Always performs a DFS.

By always performing a dark-frame subtraction the noise caused by the hot-pixels will be removed from any image. There will be an increase in processing time.

### Only First RAW in Series Enable [●] / Disable [ ]

When shooting in continuous mode, this will only create a RAW capture for the first image. Subsequent images will not have RAW captures. This allows rapid continuous shooting.




### RAW File in Dir with JPEG Enable [●] / Disable [ ]

Saves RAW files in the same folder as the JPEG files. If disabled then RAW files are always saved in the 100CANON folder.

### RAW File Prefix [CRW_, SND_, IMG_] < Raw parameters < Main Menu

CHDK lets you name RAW files with any combination of the standard prefixes IMG_, CRW_, SND. If you are going to process the RAW files with DNG4PS-2 then setting a prefix of IMG_ will allow DNG4PS-2 to retrieve EXIF data from the accompanying JPEG.

### RAW File Extension [.CRW, .CR2, .THM, .WAV, .JPG]

Set the extension to be used on RAW files, so the files are visible when you connect the camera via USB. (**See:** Downloading via USB, on page 46.)

### RAW subtract extension [.CRW, .CR2, .THM, .WAV, .JPG]

Using more than one extension with the same prefix can cause a problem with USB listing.

**See:-**
http://chdk.setepontos.com/index.php/topic,2045.msg18862.html#msg18862 Thanks *reyalp.*

### RAW develop < Raw parameters < Main Menu

This feature is for RAW files created with CHDK, not the Canon native RAW of some cameras.

Use this feature to process a RAW file and create a JPEG from it. When selected, a file browser window is displayed. Select a RAW file and press FUNC.SET, press FUNC.SET again to clear the message, then press the <ALT> button to exit <ALT> mode. Finally, press the shutter. The RAW file will then be processed into a JPEG. The interesting aspect of this feature is that the processing will occur with the camera's current settings. So you can use the MyColors settings to create Vivid and Sepia versions of the same image, or simply tweak the sharpness or contrast settings. Normally, you would have to set MyColors before the image is taken, and you would get only one image, it's a bit like using the RAW image as one would have used a film negative to process photos in a darkroom, making multiple changed photos with the one "negative".

### Bad pixel removal [ Off, Average, RAWconv ] < Raw parameters < Main Menu

To remove defective pixels effects in an image. Once you have generated a list with all the "bad" pixels for your camera, CHDK can remove them automatically.

**See explanation at:-** Bad pixel Notes on pages 52, 53, (including "Create badpixel.bin")

### DNG format Enable [•] / Disable [ ]

Automatic conversion of RAW image to the DNG format, in the camera. This format can be read by many image editing programs. Also includes meta data like EXIF and white-balance / color matrix information. For this feature to be activated, the CHDK file badpixel.bin is required, it can be generated either on a Windows PC (**See:** Pages 52, 53 for important information), or directly in the camera from the RAW menu.

This file contains specific information on camera-pixel errors. The DNG files created have the same file extension as described in RAW, and can be reset manually to DNG. There is also an automatic function to rename for most cameras. DNG format is now the preferred method of CHDK RAW capture.

### 'DNG' file extension Enable [•] / Disable [ ]

To distinguish DNG from RAW files. The DNG RAW image files will be stored as <filename>.DNG with this option enabled, otherwise the extension from the "RAW file extension" menu entry is used.

**See:** Downloading via USB, on page 46.

### RAW buffer cached Enable [•] / Disable [ ]

When enabled, saves the DNG file using the RAW buffer (recommended).

**More about RAW**

The easy way to transfer RAW files to your computer is to use a memory card reader. The most versatile way to work with RAW is to use the DNG format (Digital NeGative). This format can be produced in camera. The resulting DNG files can then be processed with Photoshop or many other popular photo processing applications.

**See also**:- Raw notes on page 50



## USB Remote notes

### USB Remote Cable

Using a USB cable, a low voltage power supply, and a push button switch, you can construct a device that will allow you to remotely trigger the shutter of your CHDK-enabled camera. Remote triggers are most often used in low-light situations when pressing the shutter button on the camera could introduce picture spoiling camera shake, but can also be useful in other circumstances - for instance if you wish to trigger the shutter with your foot, or with an electronic signal from another device, ie. wireless IR or RF. In order to trigger a CHDK camera remotely, you will need to connect a suitable triggering device to the USB socket of the camera, ensure "Enable remote" is selected in CHDK, select a shoot mode (i.e. not playback mode, movie mode, alt mode, etc) with CHDK still running, operate the trigger!

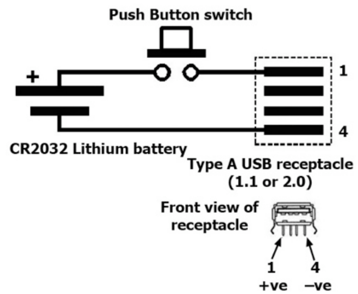
### Triggering devices

The triggering device should incorporate a power supply - a battery, for instance - that has its negative (or ground) terminal connected to pin 4 of a mini-USB cable and its positive terminal connected to pin 1 of a mini-USB cable via a momentary push-to-make switch. The power supply should provide a voltage that is no greater than 5V (or you can risk damage to your camera), but which must be greater than or equal to the minimum voltage specified on the Camera-Features page. This is a low power circuit, ~0.5mA, and only requires light duty components.

**See**:- http://chdk.wikia.com/wiki/CameraFeatures

### Homemade USB remote cable

A popular method for remotely triggering CHDK-enabled cameras involves constructing a simple triggering device from a 3V CR2032 coin battery, a USB extension cable, and a push switch. The camera's USB cable is then attached to the camera at one end and to the triggering device by the other end. Below is a circuit diagram of such a switch.




If you are cutting up a commercially-made USB extension cable, then wires 1 and 4 are red and black, respectively, according to the USB standard. It seems that even cheaply made USB cables follow this standard. Recent cameras have a combined USB and AV connector, a "splitter" type cable & connector is required.

**Note** that the 3V CR2032 battery might not be enough to trigger the camera, if not, you may need to use a different power source, e.g. three 1.5V AAA cells connected in series.

**From** *ultimA's* **notes,** 22 /August /2010 (edited) –

“The functionality of “Lock Edge overlay” has changed, and has been renamed - “Panorama mode”. Previously its greatest use was to enable loading a saved overlay to your camera. But the loading code has been changed so that locking the overlay before loading a stored one is not necessary anymore. “Panorama mode” now means “Stay in Frozen mode while locked, while capturing new overlays on a full shutter press”. This means that while the lock is on and the overlay is “Frozen”, normal behavior is not restored if taking a new picture. The camera will instead update the edge overlay and stay in Frozen mode. This allows easily taking large panorama pictures, a feature that was missing previously!

Also, there is a new menu item, "Filter edges", to optionally enable pre-filtering on the viewport data instead of postfiltering the Edge overlay results as previously. This results in a much nicer image, as you will see, This filtering option produces less false-edges and makes the edge detection usable in even very noisy environments. "Filter edges" is used as an option (can be enabled or disabled) to avoid the extra overhead required, which on some cameras might slow Edge overlay operation.

If you are in Frozen mode, when the overlay is displayed (for example during half-press) the message "Frozen" is on the screen. If this text is displayed, it is in Frozen mode, and you are able to save the overlay. In Frozen mode the edge overlay does not get updated during half-press, it is only being displayed. You have to be in Frozen mode to save. Just take a shot and the overlay will be in memory after that - even when not displayed on the screen, as long as you are in Frozen mode, then you can save the image, this is a small behavioral change, it seems more logical and more consistent”

To move an overlay - with a loaded overlay first switch to <ALT> mode, then press a Directional button - ▲ ▼ ◄ ► to move the overlay continuously until you release the button, or click the button to move in steps.

It would be advisable to make a log of the saved edge overlays, keeping a description together with the file number and date of the file, to keep track of them over time, perhaps adding GPS information as well.

When using new Edge overlay for the first time, start with a fresh CCHDK.CFG configuration file, just go to the old one and delete it. There are new configs. with the new Edge overlay which might cause some conflicts. Disable Edge overlay when using the Canon Panorama Stitch Assist mode.

---

## Curves notes

**Custom Curves**

Enables the use of custom "curve" profiles to adjust the exposure of RAW and JPEG images.
Please read this long thread - Custom processing for JPEG (Tone curve, CA ...) :-

http://chdk.setepontos.com/index.php/topic,932.0.html , at the CHDK Forum, for its full functions and use. As well as downloading a custom-curve editor (for PC) to create your own profiles. For those of you new to curve adjustments to exposures there's a nice little overview to what they do and how they might affect an image in this Curve Anthology:

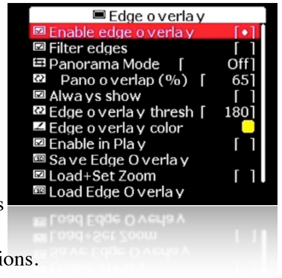
http://www.curvemeister.com/support/curvemeister2/help/Articles/CurveMoves.htm
Difference between CV and CVF curves: CV curves are the standard RGB curves. CVF curves are special versions of the curves which intends to avoid color shift side effect of the RGB curves. They are an approximation of the luminance curves. Except the SYSCURVES.CVF file, it is recommended to put the curves files in the \curves directory.

---



## Edge overlay < Main Menu

**Enable edge overlay** Enable [•] / Disable [ ]




Creates and overlays a high-contrast outline of the edges in a scene. With the default CHDK settings the Edge overlay will be visible while the shutter button is half-pressed. Once a picture is taken, the overlay will be frozen and it will not update until a second picture is taken, allowing you to align image features in the new shot to the previous one. During that time you can use the camera's Directional buttons – ▲ ▼ ◄ ► in ALT-mode to move the overlay of the previous picture Up, Down, Left, or Right.

**See:** Edge overlay notes - Page 53., for further description and instructions.

Zebra mode should be disabled when using the Edge overlay, and disable Edge overlay when using Canon Stitch Assist mode.

### Filter edges < Edge overlay < Main Menu

This option applies noise filtering to the edge overlay. It makes the overlay redraw slower but cleans the overlay of noise that appears in low-light scenes. To reduce overhead of Edge overlay, use 'Filter edges' only when required.

### Panorama Mode [ Off, Right, Down, Left, Up, Free ]

When this option is not set to Off, the edge overlay will not update continuously, but only when images are taken. Except for the very first image, you will always see the overlay of the previous image in frozen mode. "FROZEN" is shown in the OSD.

**Note:** Panorama mode returns to Off on each camera startup.

**Off** - Does not lock the overlay and it will keep updating.

When set to either **Right, Down, Left** or **Up**, the camera will automatically move the overlay in the opposite direction by the amount corresponding to the "Pano overlap (%)" setting. This is useful so that you can align the next image of a panorama series in the corresponding directions.

**Free** - The overlay will not update continuously, and it will not be moved automatically in any direction, (it will be centered), however, you can use the Directional buttons – ▲ ▼ ◄ ► in ALT-mode to move it manually.

### Pano overlap (%) [ 0 - 100]

Set the overlay offset for Panorama mode, affects each of the options in Panorama mode except "Free".

### Always show Enable [•] / Disable [ ]

When enabled, the Edge overlay will be visible even without half-pressing the shutter button.

### Edge overlay threshold [ 0 - 255 ] < Edge overlay < Main Menu

This setting adjusts the Edge-overlay sensitivity. Lower values create edges along lower contrast / lower-brightness edges, but can potentially cause more noise. Higher values create edges only on the highest contrast/ brightest boundaries, and therefore fewer, finer, and more well defined lines. The downside of using higher values is that some edges might be missed. In general, lower values are more useful with low-light scenes, while higher values are more useful with bright scenes. If you get too much noise, try the Filter edges option.

### Edge overlay color < Edge overlay < Main Menu

When selected press FUNC.SET to display the standard color selection palette, to choose an edge-overlay highlighting color. Choose a color then press FUNC.SET again to register that color with this function.

### Enable in Play     Enable [•]  / Disable [ ]

Enables edge-overlay to be displayed in playback mode.

### Save Edge Overlay < Edge overlay < Main Menu

After creating an overlay, navigate to this menu item and Press FUNC.SET to save.
For further description refer again to Edge overlay notes - Page 53.

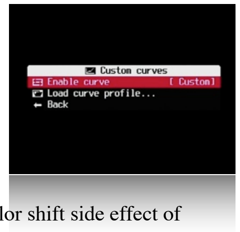
### Load+Set Zoom     Enable [•]  / Disable [ ]

When this function is activated, the zoom position is saved with the currently loaded edge-overlay .

### Load Edge Overlay < Edge overlay < Main Menu

Press FUNC.SET takes you to Edge folder, choose a saved edge overlay to load, Press FUNC.SET to load.

## Custom curves < Main Menu




Enables the use of custom "curve" profiles to adjust the exposure of RAW and JPG images. (Cameras with 12 bit sensors are not yet supported-May 2010).

Difference between CV and CVF curves:
CV curves are the standard RGB curves.
CVF curves are special versions of the curves which intends to avoid color shift side effect of the RGB curves. They are an approximation of the luminance curves.
Except the SYSCURVES.CVF file it is recommended to put the curves files in the CHDK /CURVES directory.

**See**:- http://chdk.setepontos.com/index.php/topic,932.0.html

### Enable Curve [ None, Custom, +1EV, +2Ev, Auto DR]

- **None -** No curve profile is applied.
- **Custom -** A custom curve profile is applied as-is.

The following three options require that you have a SYSCURVES.CVF file in your /CHDK folder, this file is included in the "complete" CHDK packages. It is also contained in a file at - http://chdk.setepontos.com/index.php?action=dlattach;topic=932.0;attach=1816 which also contains the editor.

Due to the limitation to short 8.3 file names in the file browser of current DryOS-based cameras the file "SYSCURVES.CVF" should be placed on the memory card by a card reader, in the CHDK File Browser the file name is shown in shortened format as "SYSCUR~1.CVF".



**[Off]** With this setting no Bad pixel removal processing takes place.

**[Average]** With this setting CHDK calculates the color for the bad pixel based on its four neighbor pixels with a simple average calculation and then interpolates - bad neighbor pixels will be ignored in this calculation.

**[RawConv]** This setting means - intended for use with post processing raw converter software to remove the bad pixels later in the workflow. With this setting CHDK just sets the bad pixel to the value 0 (zero), without any other calculation or modification. Most RAW-capable apps. will detect this and apply their own algorithms. This option is ignored in DNG mode (in DNG mode bad pixels are always averaged by CHDK).
Quote from senior developer *ewavr* - 'You can compare bad pixel removal quality in both modes, IMO, "RAWConv" mode is preferred, because CHDK interpolation is very unsophisticated'.

**Note:** With DNG format enabled, bad pixels identified by badpixel.bin are always removed - (interpolated / averaged) by CHDK. This does not affect the "Bad pixel removal" option, which also fixes user specified pixels.

**Forum discussion:** http://chdk.setepontos.com/index.php?topic=3098.msg28955#msg28955
re: "Average" and RAWconv"

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## Edge overlay notes

**Description for builds prior to 0.9.9 r928** - (original code and part of description from early CHDK developer *hiker_jon*)

A valuable feature for anyone needing to align features for panorama stitching or for doing stop-frame animations. Similar to an "onion-skinning" mode (see Google) in animation software. During shoot mode half or full press this feature adds an overlay based on the image edges, additionally a grid that matches the Canon frame is added.

Use the left, right, up or down buttons to shift the overlay (use it in <ALT> mode to avoid changing the Canon options). The edge overlay is frozen when taking a shot. The frozen edges are displayed from then on when the shutter gets half-pressed, FROZEN is shown in the OSD. When you shoot again it goes back to the original behavior - showing the edges of the current image on half-press. This behavior is useful when shooting stereo pairs. For panoramas you would want to freeze the edges after every full press. Zebra mode should be *disabled* when using the Edge overlay.

**During the later part of 2010**, developer *ultimA* gave the Edge overlay a major overhaul, (with input from forum member f_m_b), adopted in changeset 0.9.9 r928, Some of the changes are visible to the user, such as some new menu entries and a new order of the entries. Other important changes are less visible, such as rewriting of the code and its effect on the use of the Edge overlay, mainly the changes to memory use, and the "Sobel" edge detecting method. Cameras with low memory reserves can now use Edge overlay without the crashes experienced before the changes.

## Bad pixel notes

Bad, or hot pixels affect DNG images especially for long exposures. Using "Bad pixel removal" in the Main Menu > RAW parameters menu, CHDK can remove them automatically, after the "bad" pixels for your camera have been identified ("badpixel.bin"), Use this option to remove defective pixels directly while taking an image - this also affects any associated JPEG image, To obtain this list of hot-pixel coordinates you need to capture a "dark frame" by shooting an image with the lens completely capped. For shutter speeds longer than 1 to 10 seconds, it's wise to keep a collection of dark-frames on hand for each exposure length that you will be using in the future, as more warm and hot-pixels appear with extended shutter speeds. After that you can use this program: http://ewavr.nm.ru/chdk/show_bad.zip
Read more about this program & how to use it here:
http://chdk.wikia.com/wiki/CHDK_firmware_usage/AllBest#Hot-Pixel_Removal_.28Build_100-16_and_later.29

**From build 0.9.9 - 1039** a menu entry "Create badpixel.bin" is included in the Main Menu > RAW parameters menu, available if the camera has DNG support. This is a scriptless operation to create the file "badpixel.bin", (necessary to enable DNG), and overwrite any existing "badpixel.bin".

Switch to record mode (there is a reminder dialog if still in display mode), Select "Create badpixel.bin" in the RAW menu, press FUNC./SET, and the operation commences, taking approx. 20 to 40 seconds, you will notice the camera takes 2 shots, the blue print LED will come on briefly during each shot, wait for the process to complete, you will see a display of the number of bad pixels, - that number can be disturbing to some, a figure such as 15,000 or even more is not uncommon. You can check for the file with the File Browser.

**Instructions** for BADPIXEL.LUA script…

(As of build 1039, this script is obsolete. Support for it will be removed in the future, use "Create badpixel.bin" from the RAW menu instead)

* **Q.** When I select the script with FUNC./SET, nothing happens, How do I run it?

**A.** From ***fe50***- *Thanks* ***fe50***

Ok, then follow me...
- power your camera on, half-press the shutter, to go to record mode
- press PRINT, then press FUNC./SET
- select "Load script from file", go 2 steps down to the TEST/ folder, press FUNC./SET
- select "BADPIXEL.LUA", press FUNC./SET
- start the script with the SHUTTER !
- wait until you see "press SET to save....." (This may take 30 seconds or so, please be patient)
- press FUNC./SET to store the badpixel.bin automatically in the right place (/CHDK/badpixel.bin)
- press PRINT to leave the <ALT> mode, press PRINT again to enter <ALT> mode
- press MENU, go to the "RAW parameters", enter it with FUNC./SET
- enable the settings "Save RAW" , "DNG format" and "DNG file extension"
- press PRINT to leave the <ALT> mode again

Now RAW saving in DNG format is enabled, transfer the DNG files with a card reader.

**Bad Pixel Removal**

Here we will briefly try to understand the meaning of the menu options of [Off, Average, RAWconv] in Main Menu > Raw parameters > Bad pixel removal



- **+1EV -** Increases shadow detail by 1EV step.
- **+2EV -** Increases shadow detail by 2EV steps.
- **Auto DR** (auto dynamic range):

Auto DR with Zebra is intended to be used for the direct application of the curves to the shot - and not for post processing (the feature is just mimic of the Fuji S100 +200, +400 Dynamic Range). The workflow is:

**1.** - Activate Zebra display
**2.** - Activate Auto DR
**3.** Use the camera EV negative compensation to reduce the Zebra overblown highlights shown on screen. You can use the (+/-) button on the back of the camera.
**4.** Take the shot. You will directly get the JPG without post processing. The luminance of the darker areas will be raised while the highlight is compressed.

During the RAW develop process, you need to set the EV comp. to the value that you used to reduce the highlight blown out when you took the RAW. Care should be taken with in camera develop since it is a tricky art there (for White Balance issues in particular).
If the scene does not require you to reduce exposure to avoid blown highlights, the Auto DR feature does not do anything.

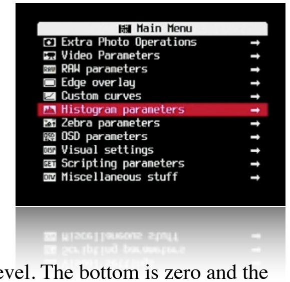
### Load Curve Profile

Load your choice of curve profile from the /CHDK/CURVES folder. All curve profile files except for SYSCURVES.CVF should be in this folder.

**See also**:- Curves notes on page 54.

## Histogram parameters

< Main Menu




Enables and customizes the Live Histogram feature.

### Histogram Anatomy

The horizontal component of a histogram runs from 0 to 255. What is important to understand is the "0" and "255" are not values…they are labels representing a color value. When you see a line in the middle of the histogram (label "127") it's saying "this is how many '127's there are in the image."
The vertical component of a histogram is the count of pixels at a given level. The bottom is zero and the top represents the largest count of values for a label. So if you have a 7MP image and every color is "127", then the top of the histogram represents 7 million pixels.

### RGB Histogram

RGB histograms simply count pixels at each level. The RGB histogram of an image of three boxes (red, green, and blue) where every color has a value of 127 would be a single line in the middle of the histogram (at label "127".)

### Luminance (Y) Histogram

Luminance histograms attempt to factor in the perceived brightness of colors. A luminance histogram of an image of three boxes (red, green, and blue) where every color has a value of 127 will show three lines at labels "38" (red- x 0.3), "75" (green x 0.59), and "14" (blue x .11).

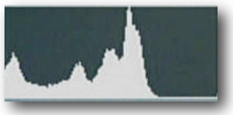
## Show live histogram [Don't, Always, Shoot] < Histogram parameters < Main Menu

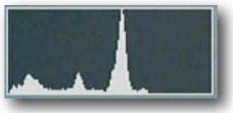
- **Don't –** Don't show histogram on LCD.
- **Always –** Always show the histogram on the LCD.
- **Shoot –** Only show the histogram when shutter is half-pressed.

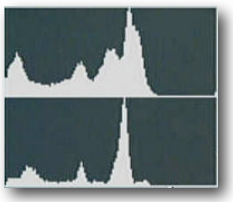
### Histogram layout [RGB, Y, RGB Y, R G B, RGB all, Y all, Blend, Blend Y]

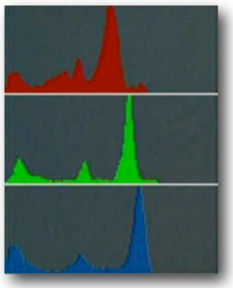
- **RGB –** Displays the RGB histogram only.
- **Y –** Displays the luminance histogram only.
- **RGB Y –** Displays RGB above luminance.
- **R G B –** Displays three histograms, one for each color.
- **RGB all –** Displays all 5 variations of histograms with RGB on top.
- **Y all –** Displays all 5 variations of histograms with luminance on top.
- **Blend –** Combines the three histogram of the R G B display into one.
- **Blend Y –** Same as Blend but with the addition of luminance below.

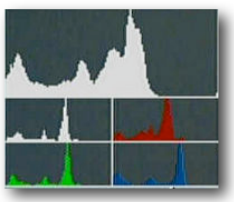
Histogram Screenshots

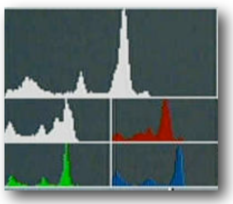
RGB


RGB Y


RGB Y


R G B


RGB all


Y all




Sources, and for further study :–

http://www.cambridgeincolour.com/tutorials/camera-sensors.htm
http://designorati.com/articles/t1/photoshop
http://encyclopedia2.thefreedictionary.com/bit%20depth
http://www.wildtramper.com/sw/crw/crw.html
http://www.howtofixcomputers.com/forums/digital-photo/bitdepth-chdk-raw-files-powershot-79781.html
http://en.wikipedia.org/wiki/RAW_image_format
http://www.photoxels.com/tutorial_raw.html
http://insights.betterphoto.com
http://chdk.setepontos.com/index.php?PHPSESSID=7973386aacdc6fb7e1b409702af56bbb&board=15.0

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## Raw Develop (for RAW files created with CHDK, not the Canon native RAW of some cameras)

Main Menu > RAW Parameters > RAW Develop

Another feature from CHDK developer *ewavr*. This allows you to select any RAW file on your SD card and then process it into a JPG file so that you may view it in your camera. Exceptionally handy after using any of the RAW Merge features so you can see the result without the need of a computer and extra RAW processing software.

Choose "RAW Develop" and a file-browser is displayed. Navigate to the RAW file that you want to process into a JPG file. After pressing FUNC.SET to select your file, you will be asked to "Switch Camera to Record Mode and take one shot." Press FUNC.SET again to back out of this menu, then use the <ALT> toggle button to exit <ALT> mode. Press the shutter button. Instead of taking an image, it will take that selected RAW file and now make a JPG file from it. It will be named according to whatever last JPG filename is in that folder and increment it by 1. Keep in mind that the EXIF data on this new JPG file will not reflect the original RAW file. It will use whatever camera settings were available at the time that you take the RAW Developing Shot for the resulting EXIF data.

**Note**: RAW file-saving must be turned ON for this feature to work. If RAW is not turned on, or you select a JPG file for "developing", then no action will take place.

---

## RAW notes

It may be said that CHDK owes it's existence to the desire for saving RAW in RAW barren Powershot cameras. By inspired work on the Firm update procedure with these cameras, it was discovered that RAW was actually a disabled function of the original firmware, and with further genius, enabling RAW saving and other functions saw the beginnings of the CHDK.

The name RAW actually suggests that this is a file without any changes straight from the camera's sensor, and with CHDK this is the case. In some cameras this is not the case, some have had some kind of processing such as sharpening, adding of a header file, Exif data, compression, and even white balance, it could be suggested even unknown processing (except to the manufacturer).
Knowing that the RAW file will contain more depth or digital information is the motivator for saving RAW, so that in processing, more digital information is available to work with.
Most RAW enabled cameras save as 12 bits per pixel or 14 bits per pixel whereas CHDK is 10 or 12 bpp, depending on the camera model, this is still far more than the 8 bit JPEG depth, This means you can make a wider range of adjustments without compromising picture quality.

RAW is therefore a powerful option that most advanced digital cameras make available to photographers who do not want the camera to apply any in-camera processing to the captured RAW data, preferring to do that themselves in post-processing. Shooting with RAW still has a fundamental principle to apply though - it won't correct mistakes that are made in the shooting procedure, exposure and other parameters are still required to be correct at shoot time for a high quality image. You cannot take a grossly underexposed or overexposed picture in RAW, and expect to be able to "correct your mistakes".

RAW data takes longer to write to a memory card and there is a need to post-process every single picture. These two requirements might be a major hindrance depending on the type of photography you do. If you need to take pictures in rapid succession, and your digital camera does not provide a large enough RAW buffer, you will be hampered by the extra amount of time it takes to write a large RAW image file to the memory card. Camera RAW files are typically 2–6 times larger than JPEG files. While use of RAW formats avoids the compression artifacts inherent in JPEG, fewer images can fit on a given memory card. Post-processing every single image is also a chore that not many amateur photographers (and some professional photographers) enjoy doing. This means that, for most practical purposes, amateur photographers will find that saving in RAW is not an interesting option, and that shooting in JPEG is more than sufficient.....Unless...You are unsure of the white balance to use or need accurate colour reproduction of a subject, or you want optimum control over sharpness, contrast, saturation;
Many photographers are finding that they *do* want the control that RAW gives them.
With some cameras, and also with CHDK, you can have the advantage of saving RAW and JPEG, this means having the option to just keep the RAWs that you need for optimum processing, or otherwise just keeping the JPEGs if you are pleased with the camera's processing. For many, saving in JPEG is more than adequate. JPEG files are compressed, and, compared to RAW, they are smaller, save faster, and more images can fit on a memory card. Many professional photographers shoot at the highest JPEG image quality. Remember also RAW can be disabled for certain shooting conditions, see the RAW parameters menu for "Disable RAW @ burst" etc.

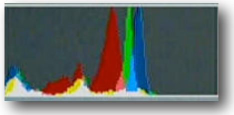
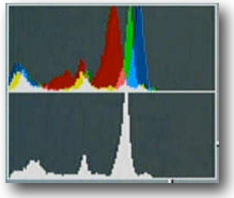
There is no single RAW format; formats can be similar or radically different. Different manufacturers use their own proprietary and typically undocumented formats, which are collectively known as RAW format. The DNG (Adobe) format has been put forward as a possible universal standard. Using the DNG format also means being able to work with the files in the future if other proprietary methods disappear.

Processing CHDK RAW is possible using a number of available applications, particularly DNG4PS-2, free software created for CHDK, others are listed at the CHDK Wiki.

Recently it has been recommended to use the in camera DNG conversion, producing a widely compatible DNG image file, recognized by the popular image editors. Using the DNG format also has the advantage of downloading over USB, including the Exif data from the corresponding JPEG.

**See:** Downloading via USB, on page 46.



Blend  Blend Y 

- **Histogram mode** [Linear, Log] < Histogram parameters < Main Menu

  Determines how the Y-axis (vertical) of the histogram will be scaled. Log is useful for scenes with a large amount of a single color, such as an overcast sky (lots of gray.)




In this example the image is both over and under exposed (the scene has a very wide dynamic range)

A 10 MP camera might have its Y-axis scaled like this...

| Linear | Log |
|---|---|
| 10,000,000 pixels | 10,000,000 pixels |
| 7,500,000 " | 1,000,000 " |
| 6,250,000 " | 100,000 " |
| 5,000,000 " | 10,000 " |
| 3,750,000 " | 1,000 " |
| 2,500,000 " | 100 " |
| 1,250,000 " | 10 " |
| 1 " | 1 " |

### Show histogram over/under EXP Enable [•] / Disable [ ]

EXP in on-screen display. If parts of a scene are over or under exposed, then this setting will display "EXP" above the histogram, and a red dot at the end that is exceeding exposure limits.

### Ignore boundary peaks [0 – 32]

Another tool for controlling the scaling of the histogram. If you know that a scene will contain large amounts of black or white (e.g a moon shot) you can set how many levels from the left or right edges of the histogram to ignore, if those levels peak in the histogram. This will increase the visibility of the smaller portion of the histogram.

**Auto magnify** Enable [•] / Disable [ ]

N.NNx in on-screen display. Another tool for controlling the scaling of the histogram. This option will magnify the Y-axis (vertical) if less than 20% of the histogram area is filled. The purpose of this function is to make the histogram easier to read when there are very tall peaks. This function lies somewhere between the Linear and Log options above. A red dot over a peak indicates that it's been clipped due to the magnification. The amount of magnification applied is displayed over the histogram.

No Magnification

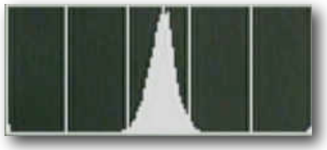


With Magnification



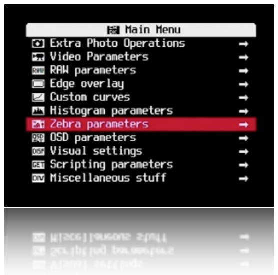

**Show Histo Ev Grid** Enable [•] / Disable [ ] < Histogram parameters < Main Menu

Adds 4 or 5 vertical lines to the histogram dividing the histogram by full stops.



EV Grid Enabled

## Zebra parameters < Main Menu




Zebra is a feature that indicates over and under exposed areas of the scene. When the shutter is half-pressed, the areas of the scene that are under or over exposed will turn red. The zebra effect can also be applied to existing images by half-pressing the shutter during playback mode.

**Draw Zebra** Enable [•] / Disable [ ]

Enables the drawing of over/under exposure indicators.

**Zebra mode** [Blink 1, Blink 2, Blink 3, Solid, Zebra 1, Zebra 2]

Determines how the over/under exposed areas will be indicated.



## KAP

**Kite aerial photography (KAP)** is a hobby and a type of photography. A camera is lifted using a kite and is triggered either remotely or automatically to take aerial photographs. The camera rigs can range from the extremely simple, consisting of a trigger mechanism with a disposable camera, to complex apparatuses using radio control and digital cameras. On some occasions it can be a good alternative to other forms of aerial photography.

(From Wikipedia - http://en.wikipedia.org/wiki/Main_Page)

CHDK scripting has become popular among the Kappers, automating cameras, and reducing the need for mechanical apparatus.

**See:** Example Pics on Page 62.

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## Bracketing notes

"Bracketing" is the taking of a series of shots with an incremental, usually subtle change in a variable between each one. Bracketing can be done with changes in shutter speed (Tv), ISO, aperture value (Av), Focus, etc, and though a bit challenging, several variables can be bracketed in combination, as well. Usually bracketing is done in order to cover a range of the variable values in an effort to capture the best of several shots, ie: to capture a perfectly exposed shot. Cameras enabled to bracket out of the box are usually either DSLRs or high end compacts, and they usually only bracket for exposure, (AEB) and mostly 3 shots maximum, CHDK allows bracketing in all the values mentioned above and for as many shots as you want, for HDR imaging for example. Bracketing can be done with specialized scripts as well, ie: to create HDR timelapse series.

Bracketing can be done hand held, "on the fly" so to speak, and is most likely done in "Continuous shooting" mode, also in Custom Timer mode if the camera can take multiple shots in that mode. A tripod is recommended for most bracketed series though to avoid alignment issues when stacking in processing. Usually, the photos are viewed after download side by side as thumbnails (or further scrutinized in a browser), the "pick(s) of the bunch" is kept, and the rest are discarded.

(**Note:** When using Custom Timer mode for bracketing, the shutter button requires just one press, not held down as in Continuous mode)

Focus Bracketing is the taking of a series of photographs where the point of focus is moved incrementally between each shot. This is usually applied to macro applications where depth of field is notoriously shallow. But there's something much more fun we can do with a handful of focus bracketed shots! "DoF Stacking" (Depth of Field Stacking) is where we combine a selection of focus bracketed photos in a similar manner to the way that three or more images are combined to make single HDR photos. Presumably, the term "stacking" most likely comes from the physical stacking of different negatives to obtain a desired effect of a photo during film processing in a darkroom. (Anyone remember those?) The resulting image from DoF stacking can have usually paradoxical qualities; the superb detail of a macro shot with the depth of field of a landscape shot. CHDK makes it possible.

**See**: http://chdk.wikia.com/wiki/DoF_Stacking

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Tv bracketing in continuous-shooting mode, long-exposure feature by *Fingalo* and A560 support followed. The first cameras to be supported were all based on the Canon Digic II® processor using the VxWorks® operating system. Later 'hacks' included Digic III cameras with VxWorks® or DRYOS® operating system. Richard Lemieux investigated the limited accuracy of the camera's distance reading. *ewavr* (aka 'Zosim') had already discovered how to read the memory-mapped hardware registers that the camera's keys, SD card status and USB-connection status were connected to.

On certain cameras, it was then possible for the software to prevent the camera going into download mode when a voltage (+3 to +5V) was applied to the USB connection (by plugging into the PC, for example). The USB status could be read like any key on the camera. This feature was included in the SDM and *Fingalo* builds and this release of SDM takes the concept further by allowing two cameras to be highly synchronized for stereo photography. New cameras were ported, the original WIKI transferred to the current one and in November 2007 a CHDK forum opened to continue discussion outside of 'DP Review'. At the end of December 2007, discussion transferred to the 'CHDK Forum'.

## Stereo Data Maker (SDM)

Yahoo StereoData Maker Group : - http://tech.groups.yahoo.com/group/StereoDataMaker

A customized CHDK with features designed for making 3D-Stereo images. (As well as numerous features for 2D photography). It provides on-screen (EVF/LCD) stereo information and can save the accompanying stereo-image's data to different file-types. See:- http://stereo.jpn.org/eng/index.html for a myriad of support programs for creating and displaying stereo images made with SDM-CHDK (Stereo Data Maker CHDK). MX3's Motion Detection feature (see below) is also included together with script commands for controlling the LEDs, all of *Fingalo*'s build 124 features, *ewavr's* Video Compression and USB 'cable release'. A560, A570,G7, IXUS700 (SD500) and IXUS800 (SD700) builds are also provided. all the features of *Fingalo* 128 and selected features from the *AllBest* builds.
The website includes a design for electronics that enables full-speed continuous-mode synchronized stereo shooting with external flash at shutter speeds up to 1/1000 sec.
Other features are :-
Drift-free synchronization at up to 1/20,000 sec with twinned-cameras for virtually no additional cost.
No hardwiring required and no vulnerable external equipment.
Single-shot, delayed single-shot and full-speed continuous-mode synchronized-shooting with external flash at shutter-speeds up to 1/1000 sec.
Synchronizing of any number of multiple cameras with fixed or progressive flash-delay.
Overriding of shutter-speed to provide values from 65 seconds to 1/40,000 sec in 1/3EV increments.
On-screen-display options include two 'Rangefinder' modes that allow you to set the near and far-point distance by using the lens telephoto setting as a rangefinder.
The resulting scene-deviation is then displayed as a horizontal bar-graph .. coloured red if it exceeds your maximum-permissible deviation and required-aperture is indicated.
<ALT> + FUNC.SET then moves lens to calculated optimum-focus for the subject-range.
'Get image-stack' in continuous-shooting mode acquires images at varying focus positions for creating extended depth-of-field images. 'Show SDM Configuration' for quick overview of settings.
On-screen displays individually enabled and all enabled displays toggled on/off by shutter half-press + key_right.

Thanks to - David - *Microfunguy*



- **Blink 1 –** Solid coverage, blinks every ½ second.
- **Blink 2 –** Solid coverage, blinks every second.
- **Blink 3 –** Solid coverage, blinks every two seconds.
- **Solid –** Solid coverage, no blinking.
- **Zebra 1 –** Striped coverage, thin diagonal lines.
- **Zebra 2 –** Striped coverage, thick diagonal lines.




### UnderExposure threshold [0 – 32]

Controls the sensitivity of exposure indication. 0 is less sensitive and 32 is very sensitive.

### OverExposure threshold [0 – 32]

Controls the sensitivity of exposure indication. 0 is less sensitive and 32 is very sensitive.

### Restore original screen Enable [●] / Disable [ ]

This option only applies to Zebra Blink modes.
When exposure indicators are visible, all of the original Canon indicators are erased. When this option is enabled, the original Canon screen items (such as exposure) are redrawn between blinks.

### Restore OSD Enable [●] / Disable [ ]

Zebra parameters < Main Menu

This option only applies to Zebra Blink modes.
When exposure indicators are visible, all of the CHDK half-shutter indicators are erased. When this option is enabled, the CHDK half-shutter indicators (such as DOF calculator) are redrawn between blinks.

### Draw over zebra [Histo, OSD, Nothing]

This option applies to all Zebra modes.
When exposure indicators are visible, nothing else is displayed on the screen. This option specifies which additional indicators will be drawn.

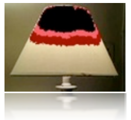
**Histo –** Only the live histogram is drawn with the exposure indicators.
**OSD –** The entire CHDK OSD is drawn with the exposure indicators.
**Nothing –** Nothing else is drawn with the exposure indicators.

### RGB zebra (overexp. Only) Enable [●] / Disable [ ]

Overexposed areas are indicated by the color of the channel that is overexposed. Underexposed areas are ignored.

Black – All channels are overexposed.
Red – Red channel is overexposed.
Green – Green channel is overexposed.
Blue – Blue channel is overexposed.
Cyan – Green and blue channels are overexposed.
Magenta – Red and blue channels are overexposed.
Yellow – Red and green channels are overexposed.

Solid



Zebra



## OSD Parameters < Main Menu

### Show OSD    Enable [●] / Disable [ ]

The CHDK On Screen Display.

- **Hide OSD?** [ Don't, In Play, On Display, both ]
  - **Don't** - always shows the OSD icons/elements
  - **In Play** - hides them in playback
  - **On Display** - hides them when you toggle the CANON icons on/off with the display button (does not work for the evf)
  - **both** - hides OSD in both playback and by "display button cycling", helpful to those who don't need the battery and other indicators in their playback screens.

### Center Menu    Enable [●] / Disable [ ]

An adjustment to the CHDK Menu screens to place them evenly on the LCD screen.

### Auto Select 1st Entry @ Menu    Enable [●] / Disable [ ]

Quickly position the menu-selection cursor on the first entry in any CHDK menu. Instead of having to press DOWN once to enter the menu options it will now start out already on the first menu option.



## History of CHDK

From Stereo Data Maker site:- http://stereo.jpn.org/eng/sdm/chdk.htm :
and - http://stereo.jpn.org/eng/index.html

During the second half of 2006, programmer '*VitalyB*' studied a disassembly of the firmware update for an (IXUS / SD camera in order to understand the Canon firmware-update procedure.
With that knowledge, he was able to write his own program that installed itself and then downloaded a copy of the Canon firmware by blinking an LED.
The program was installed in playback mode via the standard 'Firmware Update' option.
The hack copies the original initialization firmware and modifies it so that less ram is available to the OS.
A custom process is then run in an area of ram that is not accessible to the OS.
After studying the camera firmware, he developed the "RAW enabler" that allowed A610 users to save uncompressed 10-bit RAW images as well as the JPG images.
Adam Dunkel's uBASIC interpreter was included to allow support for scripting and Pablo d'Angelo improved the parser to replace line-numbers with labels.
The initial builds provided a 'live' histogram, scripting, three-exposure-bracketing and, to the irritation of many users, displayed "hello world" on the screen. Support for A620, A630 and A710is quickly followed.
Log/linear histograms were added followed by RGB histograms and a layout editor for the on-screen displays (OSD) allowed the user to move them to the most convenient locations.
Future development would rely on cameras and their firmware dumps being available.
It was published on a Russian website and when 'discovered' in mid December, a poster on DP Review forum 'Canon Talk' said "sounds very interesting. surprised no interest in it."
That would soon change ... in February 2007 'DP Review' reported another programmer '*GrAnd*' had added display of miscellaneous values (focal distance, zoom step and factor, hyper-focal distance) and a battery meter.
Users were initially wary that this 'hack' may damage their cameras but after others had tested it they became enthusiastic about each new feature.
*GrAnd* added shadow and highlight-clipping warnings to the histogram, a DOF calculator (based on the real aperture-value) displayed on shutter half-press and percentage-capacity indication for the battery with adjustable min/max voltage.
A file-browser and text-reader followed together with 'flash-light', choice of prefix, extension and save-location for RAW files.
Instead of loading each time the camera was turned-on, CHDK was next made auto-loading by using a 'locked' SD card containing a DISKBOOT.BIN file.
After booting, the file DISKBOOT.BIN is 'hidden' so that the camera is not in a permanent boot-state.
A calendar and clock were added together with text-reader auto-scroll, support of RBF fonts and initial support for the S3IS.
The DOF calculator for the S3IS was based on interpolation of the lens focal-lengths.
By request, *GrAnd* started an English-language WIKI and also provided a very convenient, ready-to-use Windows environment for would-be CHDK developers.
*GrAnd* also developed all the essential tools and functions that we now regard as the basic CHDK.
This major innovation made it possible for relatively inexperienced programmers to develop their own specialized builds. The first was SDM in June 2007, followed in September by *MX3*'s motion-detection and then *Fingalo*'s enhanced uBasic scripting commands.
Other people provided downloads of firmware and ports of the basic CHDK to additional camera models.
The A640, A700, A710, G7, IXUS700, A570 (by *Rossig/MX3*) and IXUS800 were soon supported and new video features added.

The size of the 1st partition is fixed to 2MB in the code (not changeable in the CHDK menu), but you can change it there and compile your own build, if you know how, using *whim's* CHDK Shell, - http://www.box.net/shared/njaq9vvozu [4]

Normally the creation of a partition deletes all data on the card, the swap command should not delete any data, but you should test this first!

The partitions can also be created manually with a card reader on a computer, the 1st partition must be less than 4GB and formatted with FAT16.

To prepare SD cards, and make them bootable for auto starting of CHDK, the applications Cardtricks, or SDMInst.exe, are used on Windows OS, and SDMInst for Mac OS. For installation information and instructions, see the supplement to this User Guide:
http://chdk.wikia.com/wiki/File:CHDK_Installation_Guide.pdf

- **ALT +/- debug action** < Debug parameters < Miscellaneous Stuff < Main Menu

Action for the +/- key (on IXUS / SD series DISP. is used instead) values are [None], [Dmp RAM] -> a complete memory (RAM) dump will be written to the SD card
[Page] in this mode the page shown in the propcase viewer can be changed (double-press changes the paging direction - up/down)

- **Show saving time** < Debug parameters < Miscellaneous Stuff

## Remote parameters < Miscellaneous stuff < Main Menu

**See:** Page 36

## DNG visible via USB Enable [•] / Disable [ ]

This feature enables the display of DNG files on your computer, via USB connection.

CHDK RAW and DNG files can be downloaded to a computer with the USB cable under the correct conditions; Instructions from CHDK forum senior member *fe50*:-

- disable remote in Remote parameters
- use .CR2 as file name extension (set up in the CHDK RAW menu)
- before you connect the camera to the computer's USB port you must power off and power on the camera (**important !**)
- connect the camera, do not use the Windows transfer assistant - open the Windows Explorer,
- transfer (copy, e.g. with drag & drop or cut & paste) the images to your hard disc.
MacOS users - use Image Capture or Canon Camera Window to open when camera is detected. [5]

You can also transfer RAW images in the DNG format this way, but you must use .CR2 filename extension in CHDK; after transferring the files you have to rename them (give them the correct extension - .DNG).



## Enable Symbols Enable [●] / Disable [ ]

To display Menu Symbols



With Symbols

Without Symbols



## User Menu < OSD parameters < Main Menu

Add frequently used menu items to make a custom easy access menu.




### User Menu Enable < OSD parameters < Main Menu

[ Off, On, On Direct, Edit ]

- **Off** - Disables use of the User Menu
- **On** - Enables the User Menu when in <ALT> mode and pressing [HALF-PRESS] + MENU.
- **On Direct** - When entering <ALT> mode your User Menu will be automatically displayed without having to press the MENU button. You can reach the main menu by scrolling to the top or using a [HALF-PRESS] + MENU shortcut keys.
- **Edit** - Enters the editing mode for the User Menu.

To copy other menu-items to build your custom User Menu (Up to 10 entries)...

Still in OSD parameters, select **User Menu Enable [ Edit]**, now browse to any menu and select the item you want to add to the User Menu, then press the Exposure/Erase button or the equivalent button on your camera. The item has now been added to your User Menu. Each new item is added as the lowest on the menu. To delete an item, in Edit mode, select the item and press button (or equivalent). When editing is complete remember to set the User Menu Enable option back from "Edit" to either "On" or "On Direct".

**Customizing hint / reminder:** Some CHDK features require 2 or more options that work together. An example, "Override Shutter Speed" might also need its associated "Value Factor" selection and the "Shutter Speed Enum Type" if you frequently change that too. Be sure to copy any related menu items together so they are still available where you need them in your custom menu.

### User Menu as Root    Enable [●]  / Disable [ ]  < OSD parameters < Main Menu

Toggles the behavior of the Menus when the User Menu is turned ON. When this option is set then the User Menu will be the first one to be seen, and the main menu can be reached by using the [HALF-PRESS] + MENU shortcut keys, or just selecting the top entry "Main Menu".

### Show State Displays    Enable [●]  / Disable [ ]  < OSD parameters < Main Menu

Displays the Override, Bracketing, and Override Disabled settings in their own position-able information area.

### Show Temperature  < OSD parameters < Main Menu

- **Off** - No display of camera component temperatures.
- **Optical** - Displays the temperature of the optical elements (most assume this is used for the IS mechanism and Zoom / Focus motors). When the camera is first turned on this will most accurately reflect the environmental temperature.
- **CCD** - Display the temperature of the CCD. Let's you know when it might be getting too warm. Or when it's cold enough to take lower-noise images.
- **Battery** - Displays the temperature of the battery compartment.

  NOTE: 3rd party LI-ION battery packs may always report a constant temperature, e.g; 25°C or 28°C.
- **all** - Displays all 3 values.

  **in Fahrenheit** -    Enable [●]  / Disable [ ]

  Default is Centigrade, check this for Fahrenheit.

  **Note:** Not all models have a separate temperature sensor for each component, and due to differences in design, values reported by different models may not be directly comparable.

### Show USB Remote    [ Off, Icon, Text]

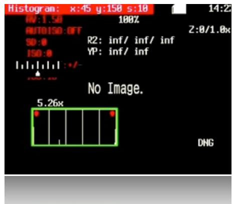
Displays the USB remote indicator with an icon depicting a USB socket, or as text - <USB> indicating that a remote shutter release can now be used.

### OSD layout editor  < OSD parameters < Main Menu

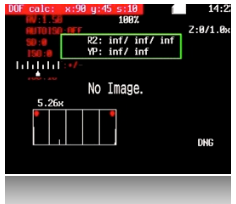
The OSD items can be rearranged to suit personal preferences and to avoid the Canon items on the display.



Enter Layout Editor



Histogram selected



DOF calculator selected

When a feature is selected you can use the camera's Directional buttons – ▲ ▼ ◄ ► to move it around. A red highlight is displayed giving the name of the feature being moved and its position in X, Y format.



**A720IS**



## Memory Card Benchmarks Example

**(Guide only, many variables to be considered)**

| SD-card model, size | Speed (Kb/s) Write (RAW) | Write (Mem) | Write (64k) | Read (64k) |
|---|---|---|---|---|
| Canon, 16MB (bundled) | 2254 | 1859 | 1754 | 3508 |
| A-DATA Speedy, 2GB (FAT16) | 2254 | 3164 | 2532 | 5572 |
| Kingston, 2GB Ultimate | 2254 | 10326 | 7692 | 6742 |
| Transcend, SD 4GB, Standard (FAT16 fresh format) | 2254 | 3980 | 3623 | 5930 |
| Transcend, SD 2GB, 80x | 2254 | 7629 | 5505 | 6476 |
| Transcend, microSD 2GB, Standard speed, MLC | 2254 | 5358 | 5468 | 9153 |
| ByteStor, SD 1GB, 50x | 2254 | 8060 | 6132 | 7021 |
| SanDisk, SD 1GB, Ultra II 60x | 2254 | 8840 | 5591 | 6606 |
| SanDisk, SD 2GB, Ultra II 60x (fresh format) | 2254 | 9600 | 7123 | 8445 |
| SanDisk, SDHC 4GB, Ultra II 60x (FAT16 fresh) | 2254 | 8718 | 5627 | 6715 |
| Sandisk, SD 2GB, Extreme III 133x (fresh format) | 2254 | 10686 | 7594 | 8316 |
| EMTEC, SD 2GB, 60x (FAT16 fresh) | 2254 | 8073 | 7407 | 8672 |

- **Create card with two partitions** (See Notes section at end for late news)

> **BEWARE: This can DELETE ALL data on the card !**
>
> This feature is used with SDHC cards larger than 4GB, on supported cameras (needs multi partition support) it will create a small FAT16 partition with a size of 2MB for CHDK and a larger partition formatted as FAT32 to store the images. On such a prepared card the camera boots up CHDK from the small partition, then the partitions are automatically swapped, this way the full capacity of the FAT32 partition can be used. The partitions are not shown correctly under MS Windows, only one of the two partitions is shown, to access the other partition without a special system driver, the partitions should be swapped with "Swap partitions"

This option creates a 2 MB FAT partition on the SD card, that's fixed on the code for now. Copy the CHDK firmware extensions to this partition and load them, (The DISKBOOT.BIN and PS.FI2 files). Then select "Make card bootable" in "Main Menu > Miscellaneous stuff", so it does not complain when you write-protect the card.

Next step is to select "Swap partitions" in "Main Menu > Miscellaneous stuff", this will hide this small partition and make the larger FAT32 one visible. We need to format it, and copy CHDK files DISKBOOT.BIN and PS.FI2 to it too, so we can perform "swap partitions" again. So format it in FAT32, copy CHDK, insert it on the camera and load CHDK using "Firmware Update", Select "Swap partitions" and "Make card bootable", write-protect the SD card, (lock with slider on side of SD card) and power-cycle the camera. It should now load CHDK from the small 2 MB partition, but have access to the larger FAT32 partition to store pictures, video and the CHDK folders.

The values are generally shown unsigned - that's because the propcase viewer doesn't know whether a value is supposed to be signed or unsigned, and treats everything as unsigned. "65152" is just the same value as "-384" when considered as an unsigned short rather than a signed short. Shows the task list, only on VxWorks cameras.

- **PropCase / ParamsData page** < Debug parameters < Miscellaneous Stuff

**[ 0 -128 ]** Search pages, each page shows 10 values

**Property cases** (PropertyCase or PropCase) are basically variables in the camera's RAM that we can read and write from CHDK by using uBasic commands **get_prop** and **set_prop**. "Under the hood" some other uBasic commands work by changing propcases, making it possible to use them in a portable way. Some propcases are read only. Often writing to a propcase will have a different effect than pressing the corresponding buttons on the camera's user interface. Typically this means that while you can change something like the shutter speed and the change will be effective in your photo, it may not be updated to the camera's on-screen display.
To find out which Property case a function changes see:
http://chdk.setepontos.com/index.php/topic,2666.new.html#new

**Property cases are different for Digic II and Digic III cameras.**

EXAMPLE: A570IS ISO is at #149, not #21 like on the S3IS, and the white balance control is #268, not #206. Furthermore, some Digic III cameras (G7, SD800IS, SD900) use the Digic II property set.
**You are advised to confirm that these properties are appropriate for your camera before you attempt to change them.**

- **Task list start** < Debug parameters < Miscellaneous Stuff < Main Menu

Where to display from. If you set this to more than there are tasks running on the camera, it will show the last twelve, adjusting on the fly as tasks get created and then deleted.

- **Show misc values** Enable [●] / Disable [ ]

Displays various values for service and programming purposes.

- **Memory browser** < Debug parameters < Miscellaneous Stuff < Main Menu

Similar role as previous.

- **Benchmark** < Debug parameters < Miscellaneous Stuff < Main Menu

Test write and read speed of the camera and SD cards. To compare memory cards.
Since this function during the first pass provides inaccurate values a 2nd run should always be carried out, only the values of this 2nd run are meaningful.
Example next page...



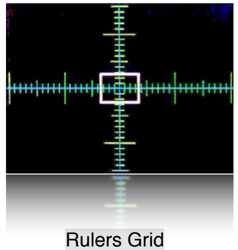
- **FUNC.SET button** - Switch between display features.
- **4-Direction switch /rocker** (Directional buttons – ▲ ▼ ◄ ►) moves the selected feature.
- **Display** (DISP.) **button** – Toggles between 1 pixel per move or 10 pixels per move.

## Grid < OSD parameters < Main Menu

Opens the Grid Lines menu. This menu allows you to select and display a custom defined grid. See the grid tutorial in the CHDK Wiki.

**Show grid lines** Enable [●] / Disable [ ]
Enables the display of custom grids.

**Load grid from file…**
Displays the file selection screen. Use the camera's Directional buttons ▲ ▼ ◄ ► to select a grid file and press FUNC.SET to select it.



Rulers Grid

**…………..Current grid……………..**
The name of the currently loaded grid.

**Override grid colors** Enable [●] / Disable [ ]
This setting will override the grid colors defined in a CHDK grid file. It will not override the grid colors of the original Canon grids selected from the Canon menu.

**Line color**
Select a color for the grid lines.

**Fill color**
Press the FUNC.SET button to view the color selection table.
Press the FUNC.SET button to select a color.

**Also see:-** Grids notes on page 56.

## Miscellaneous Values < OSD parameters < Main Menu

**Show misc values** [Don't, Always, Shoot]

- **Don't** – Don't show misc values on LCD.
- **Always** – Always show the misc values on the LCD.
- **Shoot** – Only show the misc values when shutter is half-pressed.

**Show values in video** Enable [●] / Disable [ ]
Displays the Miscellaneous values when the camera is in video mode.

**Show Zoom** Enable [●] / Disable [ ]

Z:n/n.nx in Miscellaneous Values. Displays the current Zoom position of the lens.
Z:n = zoom position, from 1 to 14

- **Show Zoom value as [X, FL, EFL]**

Method of displaying the Zoom position of the lens
**X** – as a multiple of the shortest focal length, as in 6X.
**FL** – as the actual focal length of the lens, as in 34.8 mm.
**EFL** – as the effective focal length, (35 mm Equivalent, as in 210 mm).

**Adaptor Lens Scale, 100=1x [0 – 1000]**

Adjusts the zoom value above by a multiplier, which is based on the converter lens that is installed on the camera. For a 0.7x wide converter use 70. For a 1.75x tele converter use 175.

**Show 'real' Aperture** Enable [●] / Disable [ ]

Av in Miscellaneous Values. This is the actual aperture setting after any override aperture adjustments have been applied.

**Show 'real' ISO** Enable [●] / Disable [ ]

I-R in Miscellaneous Values. Displays the actual ISO value after overrides or bracketing have been applied.

**Show 'market' ISO** Enable [●] / Disable [ ]

I-M in Miscellaneous Values. Displays Canon's ISO value, which is not always the same as the actual ISO value.

**Show ISO only in Autoiso mode** Enable [●] / Disable [ ]

Display the ISO value only when the camera is in Auto ISO mode.

**Show Set Exposure Ev (Tv+Av)** Enable [●] / Disable [ ]

Evs in Miscellaneous Values.
Show camera exposure value based on the values of shutter speed and aperture.

**Show Measured Ev (Bv+Sv)** Enable [●] / Disable [ ]

(brightness value + scene sensitivity set in a camera)

**Show Set Bv (Brightness Value)** Enable [●] / Disable [ ]

Bvs in Miscellaneous Values.
Internal-brightness scenes through recalculation of the parameters established in the camera. Just Av-Sv + Tv.

**Show Measured Bv** Enable [●] / Disable [ ]

Displays the measured brightness value, as written in the Exif data.

**Show Overexp. Value (No Flash!)** Enable [●] / Disable [ ]

Indicates a calculated overexposure value. Av-Bv-Sv + Tv



**<ALT> Mode button**

Cameras with a shortcut button can assign from a number of buttons to use as the <ALT> button, choose from PRINT, SHORTCUT, FLASH, TIMER, ISO, or VIDEO buttons, the PRINT button is the default.

Cameras that use the PRINT button as the default, but can assign another button as an alternative for use in waterproof enclosures etc; DISP. for A570, A590, A720, FACE for SX100, ISO button for A650, FE (✱) for G9,
DISP., AE/FE LOCK (✱) and LIGHT METERING/JUMP for G10, G11, G12.

**Disable LCD Off** [ **Alt**, **Script, Always, Never**]

**Alt:** LCD remains on in <ALT> mode, **Script:** LCD on during script execution. **Always:** LCD always on. **Never:** LCD off disabled, behaves as set in Canon Power Save mode. For long intervals you should disable the Power Saving options of the camera.

**Draw palette**

Allows inspection of colours and transparencies by (almost) full screen. Use the numbers of the desired colours to select them in Visual Settings menu. Use arrows to navigate palette, press FUNC.SET to select a color, press MENU to exit.

**Show build info**

Displays the current version of CHDK in use, ie: 0.9.9 - 1491, date Dec 17 2011.

**Show memory info**

Displays free RAM available, also CHDK size and load address.

**Make card bootable...**

Option to enable auto load of CHDK at startup. Memory cards must have FAT12 or FAT16 format for the bootable partition. Large cards formatted in camera will be FAT32. After selecting this option turn the camera off then remove the SD card and write protect, or "lock", the card. Reinstall the card.

**Swap partitions**

For cameras with multi partition support. To access each partition on a multi partition memory card, (in computer OS's that only read one partition) Press FUNC.SET to change to the currently inactive partition. **Also see**:- Page 45 "Create card with two partitions"

**Reset options to default…**

Reset all functions and displays back to CHDK default values.

**Note:-** By this operation you will lose all your personal settings.

**Debug Parameters** < Miscellaneous Stuff < Main Menu

In this menu internal data on the functioning of CHDK is available.

- **Debug data display** < Debug parameters < Miscellaneous Stuff

Shows debug data on the OSD, values are: [None, Props, Params, Tasks]

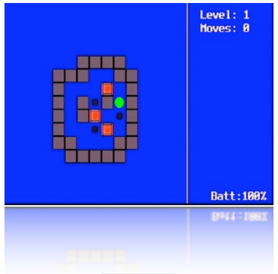
Show http://chdk.wikia.com/wiki/PropertyCase variables

## Games < Miscellaneous Stuff < Main Menu

*Yes*, games! Choose your favorite!

Switch to Playback mode for games.

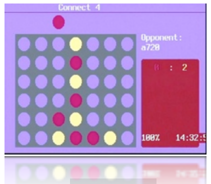
Arrow buttons - move
FUNC.SET - choose level (Moves counter should be 0).
Erase / +/- – restart current level
DISP. - show 'about' info
Zoom rocker - undo / redo moves
Use MENU button to exit.



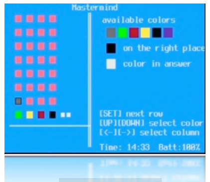
Sokoban



Reversi



Connect 4



Mastermind

If colours are not displayed properly, try entering and exiting Canon menus before entering <ALT> mode.

### Flash-light

For Cameras with fold out LCD. Turns the LCD panel into a flashlight! When in Record Mode and the LCD panel is swiveled facing forward, the LCD display turns all-white so you can see your way around in the dark, or to illuminate some close object while setting up to take a photograph.

### Show splash screen on load    Enable [●] / Disable [ ]

Mostly personal preference, shows build info, also indicates CHDK is loading.

**Tip:** Camera startup will be slightly faster if splash screen is disabled.



### Startup sound    Enable [●] / Disable [ ]

Might be handy to know if someone else is using your camera.

### Use zoom buttons for MF    Enable [●] / Disable [ ]

For a more precise adjustment of manual focus.



### Show Canon overexp. Value    Enable [●] / Disable [ ]

Indicates the overexposure value calculated by the camera.

### Show Scene luminance (cd/m2)    Enable [●] / Disable [ ]

B in Miscellaneous Values.

Run average in standard illumination scenes candelas per square meter… calculated from a ratio to Bv = 12.5.

## DOF Calculator < OSD parameters < Main Menu

The Depth Of Field Calculator displays 5 distances in meters…

- **SD –** Distance to the subject (Near Limit + DOF*0.33). Also called the Focal Plane.
- **NL –** Near Limit. The distance where acceptable sharpness begins.
- **FL –** Far Limit. The distance where acceptable sharpness ends.
- **DOF –** the Distance between the Near Limit and the Far Limit.
- **HYP -** Hyperfocal distance. Depending on the aperture and zoom settings, the hyperfocal distance reflects the optimal distance for an object to be photographed, i.e. the sharpness of that object will be the sharpest at this specific distance.

- **Show DOF calculator** [Don't, Separat, In Misc]

- **Don't** – Disables display of the DOF calculator
- **Separate** – Displays the DOF values apart from the Misc values.
- **In Misc** – Displays the DOF values with the Misc values.

### Canon Subj. Dist. as Near Limit    Enable [●] / Disable [ ]

Enabling this value affects the way the subject distance is calculated.

### Use EXIF subj. Dist. (Propcase #65)    Enable [●] / Disable [ ]

Enabling this value affects the way the subject distance is calculated.

Experimentation may be required to clarify these 2 preceding settings, they will affect script commands that establish focus, and some other camera behavior, such as focus bracketing.

The following 5 settings will determine which DOF values will appear in the OSD. When the “Show DOF calculator” is set to “Separat”, all 5 values are always displayed. When it is set to “In Misc” then only the enabled values below are displayed as part of the Miscellaneous Values.

### Show Subj. Dist. in Misc.    Enable [●] / Disable [ ]

Enable to show Subj. Dist. in Miscellaneous values on the OSD.

### Show Near Limit in Misc.    Enable [●] / Disable [ ]

Enable to show Near Limit in Miscellaneous values on the OSD.

### Show Far Limit in Misc.    Enable [●] / Disable [ ]

Enable to show Far Limit in Miscellaneous values on the OSD.

### Show Hyperfocal Dist. in Misc.    Enable [●] / Disable [ ]

Enable to show in Hyperfocal Dist. Miscellaneous values on the OSD.

**Show Depth of Field in Misc.** Enable [•] / Disable [ ]

Enable to show in Miscellaneous values on OSD.

**Subject distance from lens** Enable [•] / Disable [ ]

When enabled, distances displayed are measured from the front of the lens rather than the sensor. This is useful for macro photography.

## Raw < OSD parameters < Main Menu

**Show RAW state** Enable [•] / Disable [ ]

"RAW" in OSD. Enables the display of the RAW indicator.

**Show RAW shoot remain** Enable [•] / Disable [ ]

Calculates how many RAW captures will fit in the current free memory and displays that number next to the RAW indicator.

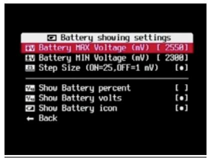
**Warning threshold [0 – 200]**

Turns the RAW indicator red when the number of RAW shots remaining drops below the threshold value.

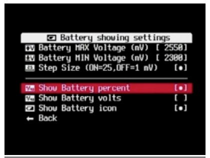
## Battery < OSD parameters < Main Menu

*Hooray for the battery indicator !*

Controls the display of the battery indicators on the LCD



Change Battery Min. & Max. Volts



Set Show Battery Percentage

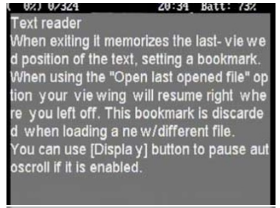



Showing Yellow Battery Icon

Set the maximum and minimum voltages to match fully charged and discharged batteries, the battery icon fill color will reduce as voltage lowers and will change to red color close to minimum voltage.

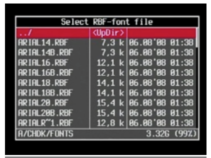


## Text file reader < Miscellaneous Stuff < Main Menu




This utility can be used to read a text file stored on the SD card. (Very convenient!, you can keep onboard instructions.)

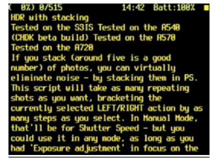
- **Open new file…**
  Displays a file browser window, opened to the CHDK/ BOOKS directory. You can select a txt file to view. Press FUNC.SET to open the file.
- **Open last opened file**
  Will display the most recent text file that was viewed.
- **Select RBF font**
  Open the file browser in the CHDK/FONTS directory. Allows you to select a different font for displaying text.
- **Codepage [Win1251, DOS]**
  Select the text file format.



Change Font



Change Color



Yellow Text Color

As with other menus, fonts and colours can be changed to suit all preferences.

- **Wrap by words** Enable [•] / Disable [ ]
  Enables word-wrap.
- **Enable autoscroll** Enable [•] / Disable [ ]
  When enabled the text file will scroll automatically.
- **Autoscroll delay (sec)** [ 0 – 60 ]
  Determines how long the system waits before scrolling the text file.

Use MENU button to exit.

### 2 ) Delete all RAW files in a selected folder




Useful when:

- You keep RAW files in the same folder as JPG files,
- You only want to get rid of some RAW files. (Very important
- shots in some other folder).
- You know which folder has a lot of out-takes.

Go to CHDK File Browser and inside DCIM folder select the folder you want (E.g. "102CANON") and push the left button to display the popup menu. Select "Purge RAW". A warning will ask you to confirm and all the RAW files in ONLY that folder will be erased. This option works like the previous one but only on the selected Canon folder, the rest are untouched.

### 3 ) Delete some or all RAW files in a list.

Useful when You want to protect specific RAW files (to use them later for HDR)
Go to CHDK File Browser, enter DCIM folder, enter a sub folder (E.g. "102CANON") push the left button to display the popup menu. Select "Purge RAW". A warning will ask you to confirm and all the RAW files will be gone.

Now the useful thing of this option is that you can mark the RAW files you DON'T want to erase (protect files). The Purge RAW function will erase the rest of the RAW files ignoring the marked ones.

**See:-** http://chdk.setepontos.com/index.php/topic,557.msg4454.html#

## Calendar < Miscellaneous Stuff




*Yes*, a calendar!

Select Year - Up / Down
Select Month - Left / Right

Use MENU button to exit.



## Filespace < OSD parameters < Main Menu

### Show Filespace Icon    Enable [●] / Disable [ ]

Displays a small SD card shaped icon on the screen to show how much filespace is left on the SD card. Opaque means remaining free space. Transparent means that space has been used. Use the OSD Layout Editor to position the icon anywhere on the screen.

### Show Space Bar [ Don't, Horizon, Vertical ] < Filespace < OSD parameters

Displays a thin SD capacity remaining "fuel-gauge" icon on the screen. Location is position-able in the OSD Layout Editor.

- **Don't** - Turn off this feature.
- **Horizon** - Displays the bar-graph gauge in a horizontal orientation.
- **Vertical** - Displays the bar-graph gauge in a vertical orientation.
- **Size on Screen**

  Changes the display size of the "Space Bar" SD-capacity gauge.
  **1/4** - the bar-graph only goes 1/4th the width or height of the EVF/LCD display.
  **1/2** - the bar-graph goes 1/2 the width or height of the EVF/LCD display.
  **1** - the bar-graph goes the full width or height of the EVF/LCD display.

- **Width/Height**

  Change the width (for vertical space-bar) or height (for horizontal space-bar) in 1-pixel increments.

### Show Filespace in Percent    Enable [●] / Disable [ ]

Displays the SD card space remaining in a percentage of its total capacity. (Toggles between this and the MB option.) OSD display element positionable in the OSD Layout Editor.

### Show Filespace in MB    Enable [●] / Disable [ ]

Displays the SD-card space remaining in Megabytes. Toggles between this and the percentage option. (see above).

### Warning Unit < Filespace < OSD parameters

**Don't** - Don't display a warning when the free SD-card space is getting low.

**Percent** - Change the space remaining display to the warning color when the percentage reaches or goes below your selected "% Threshold" (see below).

**MB** - Change the space remaining display to the warning color when the Megabytes reaches or goes below your selected "MB Threshold (see below).

- **% Threshold** < Filespace < OSD parameters

  Setting used in conjunction with above "Warning Unit" feature. Set the amount of SD-card space percentage remaining when you want that OSD element to turn to your chosen warning color.

- **MB Threshold** < Filespace < OSD parameters

  Setting used in conjunction with the above "Warning Unit" feature. Set this to how many megabytes when the space remaining feature turns to your chosen warning color.

  **Note**: This can be used in conjunction with a handy script if you need to ration the amount of photos you take on a long vacation.

  **See this:**
  http://chdk.wikia.com/wiki/UBASIC/Scripts:_Photo_Rations script.

## Clock < OSD parameters < Main Menu




- **Show Clock**

  Displays an OSD real-time clock.
  - **Don't** - No clock display.
  - **Normal** - Displays HH:MM
  - **Seconds** - Displays HH:MM:SS

- **Clock Format**

  12-hour or 24-hour format toggle. When 12-hour format is used then the chosen 12-Hour Clock AM/PM indicators are enabled.
  Also influences the temperature format. 12h - Fahrenheit.

- **12h Clock Indicator**
  - **PM** - Displays AM or PM suffix on the OSD Clock
  - **P** - Shorthand version of A or P for AM and PM on the OSD Clock (to save real-estate space). Ultra-shorthand version of AM or PM. Displays a simple "." after the time to indicate PM, no character is displayed for AM. Examples: 10:30 = 10:30 AM, 11:15. = 11:15 PM (note the small period after the 15).

- **@ Shutter Half-press Show**

  Shows the OSD clock during a half-press of the shutter button.....

  - **Don't** - No clock display on a half-press.
  - **Full** - Shows full clock time during half-press.
  - **Seconds** - Only counts off the seconds in the clock display during a half-press. Helpful when doing manual timings between consecutive shots without having to quickly call up some intervalometer script.

### Show OSD in Review Mode < OSD parameters < Main Menu

Displays the OSD when in **REVIEW** mode. Do not confuse this with Playback mode. Review mode is when your last taken photo is temporarily being displayed as you hold down the shutter-button (and press FUNC.SET to lock it into Review Mode) or when you have your Canon's Menu "Review" options turned on. This allows you to keep your on-screen grid and other settings visible when reviewing the photo to see if you got the framing or other settings as you had intended.



- **RAW Sum**

  Using the selected RAW files, this will combine them into one file. Working on an additive principle. Meaning, if you take five 65-second exposures, then RAW Sum them together, the resulting image will be equivalent to the brightness level of a 5 minute, 25 second exposure.

- **RAW Average**

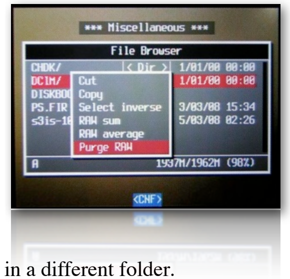
  This RAW Merge feature will, as it says, average all the frames together. Very convenient if taking several identical frames at high ISOs at high shutter speeds. This will merge them together, effectively obliterating any noise, as the noise gets averaged out. The more frames used, the less noise visible.

- **Purge RAW** < File Browser < Miscellaneous Stuff

  With this function the RAW files can be deleted in 3 different ways...

> **Caution !** Erasing files in the camera is an irreversible operation !
> Backup important images first, the data on your SD card can get damaged or **deleted !**
> The first step is to delete the JPG outtakes in playback mode (using Canon's interface).

The 3 options for the Purge RAW function and erase the corresponding RAW files:




### 1 ) Delete all RAW files in DCIM folder including subfolders

Useful when:
- You keep a separate folder for RAW files.
- You set up the camera to create a new folder everyday (several days trek, holidays etc).
- You want to erase the occasional mischievous RAW file stored in a different folder.

Go to CHDK File Browser, select DCIM folder, push the left button to display the popup menu and select "Purge RAW" (See *image above*). A warning will ask you to confirm (See *image next page*) and voila! You have regained some SD space.

This feature will search through all the folders in DCIM looking for a RAW file (CRW/CR2 prefix or file extension) and if it finds one then will look for its JPG partner anywhere inside DCIM (comparing the 4 digit number assigned by the camera). If it is not found, the RAW file is erased.

**.....................................Default Script.................................................**

The name of the currently loaded script is displayed in the **Mini Console** area at the bottom of the LCD on the left hand side.

**The Mini Console** area is where script information is displayed, messages included by diligent script authors to keep users informed of the progression of a script, and to direct input from the user for setting script parameters. Messages are defined by the "print" command in scripts.

- **Times to Repeat** [ 5 ]
  Set a number for times for script to repeat.
- **Display Delay** [ 3 ]
  In seconds

More at: Scripting Notes, page 57 and How do I use scripts? page 64.

## Miscellaneous stuff < Main Menu




### File browser

**Browse files in the various CHDK folders.**

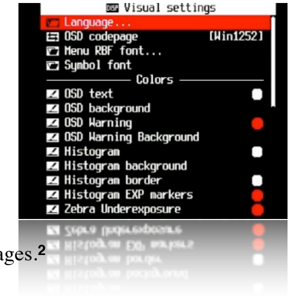


Use UP / DOWN directional buttons to highlight, FUNC.SET button to select a folder, RIGHT button to select a file, LEFT button for pop up menu for Cut, Copy, Delete, Select Inverse, RAW sum, RAW average, Purge RAW, Sub from marked, DNG -> CHDK RAW.

- **RAW Merge**
  When selecting (highlighting) files in the File browser mode, by using the RIGHT directional button, there are 2 functions available on the LEFT directional button menu.
  If after using either of these features you would like to see the resulting images without having to load them into a computer and using RAW viewing software, use the "RAW Develop" feature on the "RAW Parameters" menu to create a JPG file for playback in the camera.
  When using either of these options the resulting new RAW file will use whatever last filename was selected for merging as the prefix to the new RAW filename, and a WAV suffix will be added to it so you know which last-of-a-sequence files were used for merging. This also circumvents any confusion later when using utilities like DNG4PS with trying to merge corresponding JPG EXIF data with the original RAW data, where filenames could get drastically out of order by creating new JPG filename numbers.



## Visual Settings < Main Menu




Use this menu to make changes to the appearance of all CHDK menus, texts, backgrounds, etc., choose font types, sizes, colors.

### Language

Lets you choose another language if you have the appropriate **.lng**-file in the **CHDK/LANG/**folder of your SD card.

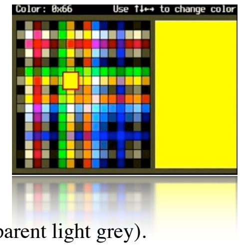
### OSD codepage

Choose the Codepage. [ Win1250 - 1257 ]
To enable display of alphabetical characters for different languages.[2]

### Menu RBF font

Choose another font (RBF format) for the CHDK menus. If you have chosen a RBF font but want to switch back to the original built-in font, just choose an "illegal" RBF font (Try to load a uBASIC script as a RBF font, for example).

**..........................Colors..........................**

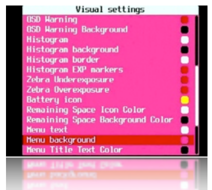



Change any of the display colors for all text and icons. If you don't change them they will remain as their defaults.
There are opaque colors and transparent colors, and also some "special effect" colors. Note that record mode and playback mode use different color tables. So it may happen that you pick a nice color in playback mode, and in record mode it will look totally different. But there are also colors which will stay the same in both modes. Some examples for A-series cams:
0x11 (white), 0xFF (black), 0x22 (red), 0x55 (green), 0x44 (transparent light grey).

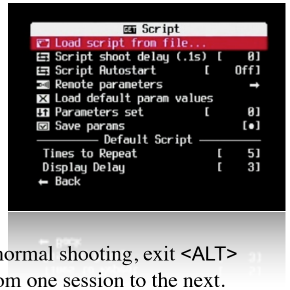
**Also see:-** Draw palette, Page 43.


Green Menu Text


Green Cursor Background


Pink Menu Background

## Scripting Parameters < Main Menu




### Load Script from File...

Enter <ALT> mode, press FUNC.SET to go to the SCRIPTS Folder, select a script, press FUNC.SET again to load it, set any required parameters to suit your needs (such as in this screenshot, “Times to Repeat”, “Display Delay” - see the script’s documentation), then press MENU to finish. Stay in <ALT> mode, press the Shutter button to run the script. To interrupt a running script press the Shutter button. To return to normal shooting, exit <ALT> mode. CHDK saves your last user-selected script parameters from one session to the next.
The default script is the one you load when you don't need a script. [3]
New scripts can be added to the SCRIPTS folder as they become available.

### Script shoot delay (.1s)

After an image is captured, indicates how long to delay the execution of the next script command. A value of 0 executes immediately. A value of 10 executes the next script command one second after capture. Mainly used to minimize camera movement before the script starts, and to allow the camera to finish other tasks.

### Script Autostart [Off, On, Once]

When enabled, the script listed under “current script” will execute immediately the camera is turned on, remember this when you see your camera operating by itself after it is turned on.

### Remote Parameters

- **Enable Remote** Enable [●] / Disable [ ]

Toggles the remote USB cable detection state, to use with scripts and manually.
When this is enabled a remote switch can be used to trigger the shutter. Have the camera in normal ***record*** mode and ***not*** in <ALT> mode. This is the same as pressing the shutter manually in all normal camera operations, while reducing or eliminating camera shake. To make or obtain a remote switch refer to - Remote notes on page 55.

**Manual usage:** To auto-focus and set exposure metering, a short press of the USB remote trigger will execute a shutter half-press, then a second press will do a full shutter-press. In other words... if USB remote is enabled, pressing / releasing the remote button is equivalent to pressing the shutter halfway, to complete the shot, momentarily release and press the remote button again within 0.5s, which will "push" the shutter all the way. This might require a bit of practice to reliably shoot each time. A USB icon or text can be shown on the OSD, see “Show USB Remote” on page 28.

**Note:** When downloading images to a computer by USB it will be necessary to uncheck “Enable remote” - Enable [ ] / Disable



**.......................synchable remote.......................**

- **Enable Synchable Remote** Enable [●] / Disable [ ]

Enables synchable scriptless remote as used in Stereo Data Maker. This changes the previous operation so that after the first press to focus, you then press and hold until the Print button blue LED shows (Ready to shoot indication) and then release to fire the shutter. The shutter fires on a falling voltage which might be more reliable on some cameras.

- **Enable Synch** Enable [●] / Disable [ ]

Used to synchronize 2 or more cameras when all connected to the same USB-Remote signal.




- **Enable Synch Delay** Enable [●] / Disable [ ]

Allows you to fine-tune the USB-Remote triggering speed to match that of other cameras when using more than 1 camera. (For stereo imagery, multi-frame stop-action Matrix (the movie) type effects, etc.) Rate of delay is adjusted with the settings below.

- **Sync Delay 1ms**

USB-Remote Sync delay in 1ms increments (1/1000th of a second).

- **Sync Delay 0.1s**

USB-Remote Sync delay in 0.1s increments (1/10th of a second).

- **Enable Remote Zoom** Enable [●] / Disable [ ]

To enable the zoom by remote control function.

- **Zoom Time-out 0.1s** [ 2 - 10 ]

Set a value for time-out, 0.1s x 2 up to 10.

### Load Default Param Values

CHDK normally saves your last user-selected script parameters from one session to the next. Press FUNC.SET when the menu cursor is on this option resets them to the default parameters as programmed into the script when first ran. A simple way to go back to a script's defaults after you've gotten hopelessly lost in many changes or just need a quick way to return to base settings.

### Parameters Set

Allows for the selection of 0 to 9 (ten) optional parameter sets for each script. If you select a new Parameter Set and then change your user-setting script parameters, CHDK will now remember your settings for each set. (The script parameter sets are saved in a CHDK/DATA/ directory named by the script in use at the time.) Now you can have up to 10 favorite settings for any one script. The next time you load the same script your favorite defaults can be called-up by just selecting numbers 0 to 9.

### Save params Enable [●] / Disable [ ]

Save current parameter settings.

**See:** USB Remote notes, page 55.

For more detailed information on the above and how to use in scripts, see:
http://chdk.wikia.com/ wiki/USB_Remote_Cable